

A N
INTRODUCTION
T O
CHRONOLOGY:
CONTAINING AN
Account of Time;

Also of the most remarkable

CYCLES, EPOCH'S, ERA'S, PERIODS,
and MOVEABLE FEASTS.

To which is added,

A brief Account of the several Methods proposed
for the Alteration of the STYLE, the reforming the
CALENDAR, and fixing the true Time of
the Celebration of *EASTER*.

By *JAMES HODGSON*, F. R. S.
and Master of the Royal Mathematical School.

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AN
INTRODUCTION
TO
CHRONOLOGY
CONTAINING AN
ACCOUNT OF TIME

OF THE
ANCIENT
AND MODERN
PERIODS

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14.
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A NEW ACCOUNT OF THE
REFORMATION OF THE
CALENDAR



BY
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OF THE ROYAL OBSERVATORY

LONDON

Printed for J. Johnson, in the Strand, near St Paul's Church-yard

M DCC XLVII

[The following are the names of the persons who have been consulted in the preparation of this work.]



THE
P R E F A C E.

THE principal Point which Pope *Gregory XIII* had in View when he altered the Year, was to settle the true Time for the Celebration of Easter; for so zealous were the first Christians that it might be rightly observed, and in the same Night the Sacrifice of Prayer be offered for the Resurrection of our Lord and Saviour *Jesus Christ*, that great Divisions arose amongst them. The *Asiatic* Christians did continually celebrate the *Pascha* on the Fourteenth Day of the Moon, or at the

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ſame Time the *Jews* did ; but the Eastern Churches never celebrated it except on the Lord's Day, that they might not ſeem to have the Solemnity in common with the *Jews*, and at the ſame time looked upon their Solemnities not as indifferent things, inſomuch that they condemned one another for neglecting the Punctilios of Time ; and ſo high was it carried, that Pope *Victor*, as well as other Popes, thundred out their Anathema's againſt the *Greeks*, which, proving of no Effect, was the Occaſion of the meeting of the Nicene^{*} Council, to moderate the great Heats that aroſe between the Eastern and Western Churches, and to fix a certain Time for the Celebration of Eaſter ; when to prevent all future Conteſts about it, it was agreed upon to this Purpoſe, That Eaſter Day ſhould be that Sunday which falls upon or next after the firſt Full Moon, which happens next after the Vernal Equinox.

** Nice a City in Bithynia of Turkey Hence
in Asia Minor where the firſt general council
was held^{in 325} by Conſtantine the great, for the
expelling of the Arian Heretic.*

The P R E F A C E. ♣

Hence, and by the Help of the true Lengths of the Julian and Solar Years, it will be easy to find at what Time the Equinox will happen, in any Year past or to come, and consequently the true Time for the Celebration of Easter; for from the Length of the Julian Year 365 Days and 6 Hours, take the Length of the Tropical Year 365 Days, 5 Hours, 48 Minutes, and 57 Seconds, and there will remain 11 Minutes and $\frac{5}{3}$ Seconds, for the annual Anticipation or Recession, which being multiplied by 100, will give 18 Hours and 25 Minutes for the Alteration in 100 Years; this therefore being added to, or subtracted from, as the Case requires, the true Time of the Equinox in any Year, will give the time of the Equinox required. For Example, Suppose the Time of the Equinox in the present Year 1747, to happen on *March* the Ninth, at 37 Minutes, 16 Seconds after Eleven in the Evening; and it be required to find

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find when it will happen in the Year 1847 which is 100 Years hence; from *March* the Ninth, 11 Hours, 37 Minute, and 16 Seconds, take 18 Hours and 25 Minutes, the Recession in 100 Years, and it will give *March* the Ninth, at 12 Minutes and 16 Seconds after Five in the Morning, for the Time of the Vernal Equinox in the Year 1847.

To the Time thus found I have sub-joined a Calculation of the Sun's Place from Mr *Flamsteed's* Solar Numbers not yet published, by which it will appear to what degree of Exactness this Method of Computation may be depended upon.

	Mean Motion				Perihelion				
	s	o	'	''	s	o	'	''	
1847 - -	9	21	20	27	-	3	10	17	48
March 8 - -	2	06	02	18	-	-	-	-	11
17 Hours - - - -	-	-	41	53	-	3	10	17	59
12 Minutes - - - -	-	-	-	30	-	11	28	05	09
16 Seconds - - - -	-	-	-	1	-	8	17	47	10
Mean Motion	11	28	05	09					
Equation add	-	1	54	11					
Sun's Place -	11	29	59	20					
Parts proper. add	-	-	-	19					
Sun's cor. Place	11	29	59	39					

Whence

The P R E F A C E. vii

Whence it appears that the Time last found, is short of the true Time of the Sun's Ingress into the Equinoctial Point 21 Seconds in Motion, which in one Hundred Years makes an annual Error of 5 Seconds in Time, and this in 1000 Years amounts to 1 Hour, 23 Minutes, and 20 Seconds in Time, which shews that it is sufficiently exact for the Purpose intended.

For the more ready and expeditious way of finding the Time when the Equinox, or any other remarkable Day, will happen, in any Year past or to come; I have added the following Table, by which it may be found with the greatest Ease.

Tables

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*A Table shewing the Anticipation or Re-
cession of the Equinoctial Day, or
any other remarkable Time for any
Number of Years under 6000.*

Years	Days	Hours	Minutes	Seconds	Years	Days	Hours	Minutes	Seconds
1	—	—	11	03	100	—	18	25	—
2	—	—	22	06	200	1	12	50	—
3	—	—	33	09	300	2	07	15	—
4	—	—	44	12	400	3	01	40	—
5	—	—	55	15	500	3	20	05	—
6	—	1	06	18	600	4	14	30	—
7	—	1	17	21	700	5	8	55	—
8	—	1	28	24	800	6	03	20	—
9	—	1	39	27	900	6	21	45	—
10	—	1	50	30	1000	7	16	10	—
20	—	3	41	—	2000	15	08	20	—
30	—	5	31	30	3000	23	—	30	—
40	—	7	22	—	4000	30	16	40	—
50	—	9	12	30	5000	38	08	50	—
60	—	11	03	—	6000	46	01	—	—
70	—	12	53	30					
80	—	14	44	—					
90	—	16	34	30					
100	—	18	25	—					

Let us now suppose the Equinox in
the present Year 1747, to happen on
March the Ninth, at 11^h 37' 16'' *p. m.*
and it be required to find at what
Time it happened in the Year of the
Nativity.

To

Chronology is the art of measuring time, and adjusting all actions and events to the several points of time in which they happened.



A year is the time in which the sun ^{from a point} apparently moves round the earth in its orbit, or the earth ^{from the west to the east} really moves round the sun.

INTRODUCTION

The astronomical or periodical year is the time where in the earth ^T moves round the sun from any star or first point in its orbit, to the same point again, and consists of 365 days 6^h 9' 14".

CHRONOLOGY.

Of the Division of Time and it's Parts;
of the Cycles, Epoch's, Era's, Periods,
Moveable Feasts, &c.

The Tropical year is the time where in the earth (or sun) performs

CHRONOLOGY, as to it's Etymology, denotes no other than a Discourse concerning Time, and is an Art that teaches us how to distinguish rightly the Times, in which memorable Things have happened; this gives a Form to History (which is a Narration of past Transactions) and History furnishes this with Matter; for as History describes the Things done, so Chronology assigns them their proper Places in the Order and Series of Time, and is made up of Two Parts.

its revolution thro' all the seasons; when being ended they will return as before.

It consists of 365^d 5^h 48' 57". The

The Egyptian year is the ancient year used by the Egyptians, and now used by the Persians and is just 365 days continually. This being shorter than the Tropical year by near 6 hours a day is lost in 4 years, and in about 1500 years

*The beginning of the year moves backward
thro' all the Seasons.*

This year is 2 **An Introduction to Chronology.**

the most convenient The first explains the Nature and Parts of Time.

for Astronomical calculations The second treats upon certain Characteristics, or Indices, by which Times are distinguished.

is it is always the same, having no intercalary days to interrupt it. Absolute, True, and Mathematical Time, considered in itself, or in it's own Nature, without Relation to any external Being, flows equally or uniformly, and is otherwise called *Duration*; to distinguish it from Relative, Apparent, and Vulgar Time, which is a sensible external Measure of Duration by Motion; and this is what *Astronomers, Chronologers, &c.* mean by the Word Time: So that by Time

See P. 13, 14.

we are to understand a certain Part of Duration measured out to us by the simple and uniform Motion of some Body, that always goes on at the same Rate, such as is the Motion of the Cœlestial Bodies, but chiefly the Sun and Moon; which have not only been agreed upon by the common Consent of Mankind in all Ages, to measure Time by, but seemed designed for this Purpose, among their manifold Uses, by the Wise Creator of the Universe himself.

Time thus measured out to us, is distinguished into Years, Months, Weeks, Days, Hours, and Scruples.

A Scruple is a very small Part of Time, and is either Horary or Diurnal.

A Horary Scruple, which is also called a Prime, is the One Sixtieth Part of an Hour, it is called a Moment or Minute, and is by

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Astronomers divided into Sixty Parts called Seconds of a Minute, or simply Seconds, and each of these again into Sixty equal Parts more, called Thirds of a Minute, &c.

A Diurnal Scruple is the One Sixtieth Part of a Day, and is divided into Seconds, Thirds, Fourths, &c.

An Hour is a certain determinate Part of the Day, and is either equal or unequal.

An Equal Hour is the Twenty-fourth Part of a Natural Day, or of that Space of Time that flows while the Sun goes from any Meridian, till it arrives at the same Meridian again.

An Unequal Hour is the Twenty-fourth Part of an Artificial Day, or of that Space of Time, that flows while the Sun is moving from the Eastern Limb of the Horizon to the Western; or the Time that he continues above the Horizon; as is the Twenty-fourth Part of the Artificial Night, or Time the Sun continues below the Horizon, called a Nocturnal Hour; these Hours are likewise called Temporary Hours, because at different Seasons of the Year, they are of different Lengths: For a Diurnal Hour in the Summer, is longer than one in the Winter, and a Nocturnal Hour is shorter; but in the Equinoctial Day, the Hours in the Day and Night are equal to each other, and to a Mean between the two Extreams; whence it comes to pass that equal Hours are sometimes called Equinoctial Hours.

A 2

These

*A day is the time wherein the sun seems to make one revolution. . . ^{natural} day is the time wherein the sun moves round the earth, which is longer by about 4 minutes than the time of the earths rotation. } Italians reckon to 24 hours
most others to 12.*

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These Hours begin at the Rising and Setting of the Sun, and were of Use among the *Jews* and *Romans*, and at this Day among the *Turks*; they are also called Planetary Hours, because in every Hour the Ancients supposed one of the Seven Planets to preside over the World, which they took by turns, that the first Hour after Sun Rising on Sunday, fell to the *Sun*, the next to *Venus*, the third to *Mercury*, and the rest in Order to the *Moon*, *Saturn*, *Jupiter*, and *Mars*. By this means on the first Hour of the next Day the *Moon* presided, and on that Account, gave the Name to the Day which we call *Monday*, and so on; whence it comes to pass that every other Day of the Week, took it's Name from that Planet that was supposed to govern the first Hour of it.

The *Hebrews*, and many of the Eastern People, as well as the *Romans*, about Three Hundred Years after the Foundation of *Rome*, divided their Artificial Day into Four equal Parts; the First of which began at the Rising of the Sun, and this First Part continued Three Hours, and was called the First Hour; and at the End of it a Signal was given to the People to let them know that the first Hour was past, and that the Second was begun, which was called the Second Hour; which also continued Three Hours, and then another Signal was given to inform them, that the Second was passed, and that the Third was begun; and that it was then the Middle of the Day, which

A Period or Cycle is a certain space of time, or a revolution^{was} of a certain number of years, which ended, begin anew. Thus. The Julian period consists of 7980 years the product of the numbers 19, 28, 15. This period was 4713 at the beginning of the Christian Era.

The Dionysian or Victorian period is 532 yⁿ, the product of 19 and 28. This period was 457 at the beginning of the Christian Era.

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was called the Sixth Hour, and this Part continued also Three Hours; which being ended, the Fourth and Last Part of the Day began, which was called the Ninth Hour, because this was the Ninth Part of the Day, which began at Sun Rise, and ended at the Setting of the Sun, and this Part of the Day they called the Vespers.

And the Church of *Rome* makes Use of these Hours at this Time for the performing of Divine Service in, and which has been in Use ever since the Year 543. The Night also was divided into Four equal Parts, which were called Watches, each Part containing Three unequal Hours; the First Watch began at the Setting of the Sun and continued Three Hours; the Second continued till Midnight when the Third began; and the Last continued till Sun Rise.

As the Sun in one diurnal Revolution passes by Four remarkable Points, viz. two in the Horizon, which are the Points of Rising and Setting, and two in the Meridian, which are Mid-Day and Mid-Night; hence it comes to pass that different People begin their Day at different Times, the *Babylonians*, the *Assyrians*, with many other Eastern Nations, as well as the Inhabitants at *Majorca*, *Minorca*, and *Neuremberg*, began their Day at Sun Rising. The *Jews*, the *Athenians*, formerly the *Greeks*, the *Italians*, the *Sicilians*, the *Bobemians*, the *Austrians*, the *Polanders*, do at this Time begin

An Era is a particular account or reckoning of their time, from some remarkable point (or Epoch) to which account all events and memorable actions are referred. This has a beginning but no ending, as a period has. Style is the method of reckoning time. The Julian Style is the Old Style and the Gregorian Style is the new.

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their Day at the Setting of the Sun, and the Hour after the Sun is Set, they call the First Hour and count on till they come to the Twenty-fourth.

The *Egyptians*, with the Antient *Romans*, began their Day at Mid-Night, which was followed and made Use of by *Hipparchus* in his *Astronomical Observations*, and is still retained in *Britain*, *France*, *Spain*, and in most Places of *Europe*, and by the Church in the Celebration of her Feasts, tho' the *Arabs*, and the modern *Astronomers*, take the Commencement from Noon, or when the Sun is upon the Meridian.

A WEEK is a Succession of Seven Natural Days, to which the *Gentiles* gave the Names of the Seven Planets; to the First Day they gave the Name of the *Sun*, to the Second the Name of the *Moon*, to the Third the Name of *Mars*, to the Fourth the Name of *Mercury*, to the Fifth the Name of *Jupiter*, to the Sixth the Name of *Venus*, and to the Seventh the Name of *Saturn*. But the *Hebrews* called every Day of the Week by the Name of Sabbath, and because the Day of the Sabbath was their Principal Day, (as our *Sunday* is to us) the Day after the Sabbath, they called the First Day of the Sabbath, which is our *Sunday*; the following Day, and which is our *Monday*, they called the Second Day of the Sabbath; and so on till the Seventh Day which was the Sabbath itself, and the Day before they called the Preparation

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paration for the Sabbath; but since the Commencement of Christianity, the Names of these Days have been changed into that of *Feria*, which signifies Feasts Days, because all the Days of the Week are Feast-Days for the *Christians*, unless otherways set aside; and the First Day they called *Feria Sunday*, or the *Lord's Day*, in Commemoration of the Resurrection; the Second Day, or *Monday*, they call the Second *Feria*; the Third Day or *Tuesday*, they called the Third *Feria*, &c. till they came to the Seventh Day, which they called the Sabbath Day, which signifies a Day of Rest; but the People in General at this Day use the same Names that were given them by the *Gentiles*.

A MONTH is a certain System of Days consisting of something more or less than Thirty Days, and is either *Astronomical* or *Civil*; the *Astronomical* Months, which are likewise called *Natural* Months, are those that are governed by the Course of the Sun and Moon, and are either Solar or Lunar.

A *Solar Month* is properly that Space of Time, that the Sun employs to run thro' any Sign of the Zodiac, which is the Twelfth Part of the whole Ecliptic; and of these there are two Sorts, the Mean Solar Month, which is the Time that the Sun requires to move thro' the Twelfth Part of the Zodiac, according to mean Motion, which consists of 30 Days, 10 Hours, 29 Minutes, 6 Seconds, 18 Thirds, 50 Fourths; and the true Solar

Month

A lunar or Synodical month, is the time between one conjunction of the sun and moon to another. It consists of 29^d 12^h 44ⁱ at a mean lunation.

A periodical month, is the time of the moon's revolution, till it come again to the same point, or the same Star. It is 29^d 12^h 43ⁱ.

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*Civil or
calendar
month, is the
length of
30 or 31 days
as it is set
down in the
calendar.*

Month, which is the Time that the Sun requires to move through one of the Signs by his true Motion; and as these Times are unequal, so the Months themselves are also unequal; being greatest when the Sun is in the Apogee, which happens when he is in about 8 Degrees of *Cancer*, and shortest when he is in his Perigee, which happens when he is in about 8 Degrees of *Capricorn*.

The *Lunar Months* are those which are measured by the Motion of the Moon; and of these there are Three Sorts, the *Periodical*, the *Synodical*, and that of *Illumination*.

The *Periodical Month* is that Space of Time that the Moon employs to run thro' the Ecliptic, or till she returns to the same Place from whence she began to move, which according to mean Motion, is performed in 27 Days, 7 Hours, 43 Minutes, 7 Seconds, but according to her true Motion in an Hour more or less.

The *Synodical Month*, is that Space of Time that elapses between one Conjunction of the Sun and Moon, and the next following, and is of Two Sorts, *viz.* True and Mean. The *Mean Synodical Month* is that which agrees with the mean Motion of the Sun and Moon, and is equal to 29 Days, 12 Hours, 44 Minutes, 3 Seconds, 11 Thirds, and is the Measure of all the Lunar Months; but the *True Synodical Month* is that which is made by the true Conjunction of the Sun and Moon, and it's Difference

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rence from the *Mean*, is sometimes greater and sometimes lesser than Fourteen Hours.

The *Month of Illumination* or *Apparition*, is the Interval of Time between the Day that the Moon begins to appear after the Conjunction, to the Day that she disappears; and this Month ordinarily consists of Twenty-eight Days, but not exactly, for sometimes she is seen sooner or later, according as she is to the Northward or Southward of the Ecliptick, or according as her Motion is swifter or slower, or according to the Signs ascending or descending in which she is.

The *Civil* or *Political Months* are different from each of these, and consist of a certain Number of Days, fewer or more, according to the Laws and Customs of the Country in which they are kept.

The *Egyptian Month* consisted of Thirty Days, and at the End of each Year they added Five Days, which they called *Epagomenos Dies*; and the *Persian Month* consisted of Thirty Days as the *Egyptian* did, and they added Five Days at the End of every Year, which they called a *Common Year*, and Six Days in the *Intercalary Years*, and these Days they called *Musteraka*.

A Year is a System of Months, and is either *Astronomical* or *Civil*.

The *Sydereal Year*, is a Space of Time that flows while the Sun is moving from a Fixed Star or Planet, till it return to, or overtake the

B

same

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same Fixed Star or Planet again; whence it comes to pass that there are two Sorts of *Sydereal Years*, the one fixed the other moveable; the fixed *Sydereal Year*, is that Space of Time that elapses betwixt the Conjunction of the Sun and any fixed Star, and the next Conjunction of the Sun with the same Star, which is always of the same Length, and contains 365 Days, 6 Hours, 9 Minutes, 14 Seconds.

The *Moveable Sydereal Year*, is that which arises from the Conjunction of the Sun with any of the Planets, and is contained between that and the next Conjunction; this Year is unequal, being different according to the different Planets; this Year with *Saturn*, consists of 378 Days, 2 Hours, 12 Minutes, 13 Seconds; with *Jupiter* it is made up of 398 Days, 21 Hours, 12 Minutes, 9 Seconds; with *Mars* it is made up of 779 Days, 22 Hours, 22 Minutes, 40 Seconds, Mean Time.

The *Tropical Year*, is a Space of Time that flows while the Sun is moving from any one of the Tropical or Equinoctial Points, or from any fixed Point in the Ecliptic, till he returns to the same Point again; this Year is likewise called the *Natural Year*, and seems as if it were designed by the *God of Nature* for to measure Time by, and consists of 365 Days, 5 Hours, 48 Minutes, 57 Seconds. (55)

But because while the Sun is moving through the Ecliptic, the Equinoctial Points themselves are found to recede at the Rate of 50 Seconds; hence

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hence it is that the Sun requires 365 Days, 6 Hours, 9 Minutes, 14 Seconds, to return to the same Point in the Heavens that he possessed the Year before; and this is called the *Periodical Solar Year*, and these are what are called *Solar Years*.

A *Lunar Year* is a certain System of Months, and is either *Common* or *Embolismic*. A *Common Lunar Year* consists of Twelve *Synodic Lunations*, but the *Embolismic* of Thirteen, and each of these Years are either Mean or True, the Mean Lunar Year, which is that which governs the Year, and is what People make Use of, consists of 354 Days, 8 Hours, 48 Minutes, 38 Seconds; and the *Mean Embolismic Year* of 383 Days, 21 Hours, 32 Minutes, 41 Seconds; the *True Lunar Year* differs from the *Mean Lunar Year*, and is sometimes greater and sometimes lesser; but this is not regarded in common Use.

As the *Common Lunar Year*, which consists of Twelve *Synodic Months*, or of Twelve *Lunations*, consists but of 354 Days, 8 Hours, 48 Minutes, 38 Seconds; whereas the *Solar Year* consists of 365 Days, 5 Hours, 48 Minutes, 57 Seconds; it is plain that the *Solar Year* exceeds the *Lunar Year* by 10 Days, 21 Hours, 00 Minutes, 19 Seconds; and consequently in the Space of about Thirty-three Years, the Beginning of the *Lunar Year* will have moved thro' all the variety of Seasons, whence it is called the *Moveable Lunar Year*;

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and this Form of the Year is at this Time observed by the *Turks* and *Arabs*. And,

Because in the Space of Three Years, this Difference between the *Solar* and *Lunar Year*, amounted to 32 Days, 15 Hours, 00 Minutes, 57 Seconds; therefore to keep the *Lunar Months* in the same Seasons and Time of the *Solar Year*, as near as possible, they added a whole Month every Third Year to the *Lunar Year*, and made it consist of Thirteen Months, by which Means the Beginning of the *Lunar Year* was kept nearly in the same Season, and this Year they called the *Embolismic Year*, and the Month itself the *Embolimæan* or *Inter-calary Month*, and these were called the *Fixed Lunar Years*, and were observed by the *Greeks* and *Romans* till the Time of *Julius Cæsar*.

The *Egyptians* made Use of the *Solar Year*, and made it consist of 365 Days just, and this being less than the *True Solar Year* by six Hours nearly, hence it comes to pass that by losing a Day in every Four Years, in Four times 365 Years, that is in 1460 Years, (which was called the *Great Canicular Year* or *Sothiacal Period*) the Beginning of the Year had moved thro' all the Seasons, this therefore was called the *Moveable Solar Year*; and is the same with the Year of *Nabonassar*, of great Esteem among the ancient *Astronomers*, made Use of by *Ptolomy*, *Copernicus*, and others, and by the ancient *Persians*, for the Space of 477 Years; till by the Command of their Emperor *Abb.*
Arsalam,

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Arsalam, about the Year 1079, they began to add a Day at the End of every Fourth or Fifth Year, and in 648 Years to include 236677 Days, so that their Mean Year consisted of 365 Days, 5 Hours, 48 Minutes, 53 Seconds.

46 years before Christ

But *Julius Cæsar*, long before this Time, finding the Inconveniencies that arose from this Method of Computation, and considering that it was necessary the *Civil Year* should always comence on the same Day, and at the Beginning of that Day, which it would not do if the Six Hours were added to every Year; and being at that time *Pontifex Maximus*, did, by the Advice and Assistance of *Sisogenes* the *Mathematician*, set about correcting the Year, and ordered that every Fourth Year should have an *Intercalary Day*, which therefore should consist of 366 Days, and that this added Day should be put in the Month of *February*, and because in the Common Year the Twenty-fourth of *February* in the *Roman Way* of Reckoning, was the Sixth of the *Kalends* of *March*, he ordered that for that Year there should be Two Sixths, or that the Sixth of the *Kalends* of *March* should be twice Reckoned; upon which Account the Year was called *Bissextile*, and is made Use of by us at this very Day, and is called the *Leap-Year*.

But because the true Length of the Year consists but of 365 Days, 5 Hours, 49 Minutes nearly, hence it comes to pass that after this

The Julian year instituted 464th before Christ contains 365 days for 3 years, called common y^r and 366 days every fourth year called leap year. But this year being longer than the Tropical year by 11 minutes, a day is gained in 130 y^r. And in 47540 y^r the beginning of the year would move forward thro' all the Seasons of the year.

The Gregorian year, was instituted by Pope Gregory in 1582, it

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consists of 365

days for 3rd

and 366 days

for the 4th year

which is leap

like the Julian.

But every 100

year that is

not divisible

by 4 must be

only a common

year instead

of a leap year.

This sort of yr

is nearest the

Tropical yr

of any, and

agrees nearly

with the

apparent

motion of the

Sun, and

is designed to keep pace with the

Tropical year.

But is very unfit for Astronomical

calculations, being perplexed with so many interca-

lations. It was contrived to be brought to the sun's motion as it

was at the time of the council of Nice in 325, which was

done by dropping 10 days out of the calendar in the month

of October

Way of Reckoning, at the End of every Four Years the Civil Year will begin 44 Minutes sooner than it did before, and consequently by this Way of counting, in 131 Years it will anticipate one whole Day; so that if at any time the Equinoctial happened upon any one Day of the Year, it will happen after the Term of 131 Years a Day sooner, and this was the Reason why Pope Gregory, the Thirteenth of that Name, in the Year 1582, being willing to celebrate Easter according to the Original Institution, and to keep up to the Letter of the Order of the Nicene Council, which was held in the Year 325, set himself about reforming the Year, and finding that between the Time of the Nicene Council and his Time, that the Equinox had anticipated Ten whole Days, ordered that these Ten Days should be taken out of the Kalendar that Year, and that the Eleventh Day of March should be reckoned as the Twenty-first, and to prevent the Seasons of the Year from going backwards as they did before, he ordained that every Hundredth Year which in the Julian Form was to be a Bissextile, should be a common Year, and consist only of 365 Days; but because that was too much, every Four Hundredth Year was to remain Bissextile? This new Form of the Year being established by the Authority of Pope Gregory himself, is called by the Name of the Gregorian Year; and is received in all those Countries where the Pope's Authority is acknowledged,

knowned, . . .
Tropical year. But is very unfit for Astronomical
calculations, being perplexed with so many interca-
lations. It was contrived to be brought to the sun's motion as it
was at the time of the council of Nice in 325, which was
done by dropping 10 days out of the calendar in the month
of October

In the last century it was 10 days before the Julian
 a year, and in the present century 11 days before
 the Julian year, and gains one day more every
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known, and in the Year 1700, it was re-
 ceived in several Places where the Reformed
 Religion is professed.

following
 century,
 except in

Besides the Political Division of the Month
 into Weeks, the Romans according to the In-
 stitution of Romulus, the first Founder of their
 State, divided their Months after a peculiar
 Manner, and that was this, the First Day of
 every Month they called the *Kalends*, because
 on that Day the Priest, whose Business it was
 to observe the Moons, according to which they
 reckoned their Month, gave Notice on these
 Days to the President over the Sacrifices, and
 he called the People together, and declared
 unto them how they were to reckon the re-
 maining Days of the Month, and which were
 the proper Days set aside for religious Uses;
 and the Day immediately preceding this they
 called the *Pridie Kalendæ*; that immediately
 preceding this they called the Third of the
Kalends; the next immediately going before
 they called the Fourth of the *Kalends*, &c. till
 they came to the *Ides* of the preceding Month;
 the Day immediately succeeding the *Kalends*
 was called the Fourth or the Sixth of the
Nones, according as the Months it happened
 in, for in the Four full Months of Romulus,
 viz. March, May, July, and October; the
 Seventh Day from thence was called the *Nones*,
 and in the rest of the Months which were
 called *Hollow Months*, the Fifth from that
 Day was the *Nones*; and the Eighth Day from

such as are
 exactly
 divisible
 by 4.

See the
 bottom of
 p. 48.

The Julian year — 365.6 the

Tropical year — 365.5.48.55"
 diff. 11.5" = 11 $\frac{5}{60}$ = $\frac{665}{60}$ (= $\frac{133}{12}$)

Council office — 325

In 1752 years June 1427 $\therefore 1427 \times \frac{665}{60} = 15815.9$

and $\frac{15815.9}{60} = 263.6 = 11 \text{ days less}$

The civil year is that which is in common use in any nation. Thus the Julian year was used in England till 1752, &

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after that the Gregorian yr was to be always used.

the Nones, which was the Fifteenth Day in the full Months, and the Thirteenth in the rest, was called the *Ides*; and these as well as the *Kalends* were all numbred in an inverted Order; and the next Day before the *Nones* or *Ides* was called *Pridie Nonæ* or *Pridie Idus*; and that which immediately preceded, was called the Second Day, &c. according to the following Lines.

*Prima dies mensis cujusque est dicta Kalendæ,
Sex Nonas Maius, October, Julius & Mars,
Quatuor at reliqui: dabit Idus quilibet octo
Inde dies reliquos omnes dic esse Kalendas.
Quas retro numerans dices à mense sequente.*

And this way of reckoning was followed by all the *Latin Churches*, and is made Use of by the Church of *England* at this Day, tho' for Civil Uses we as well as the rest of *Europe*, reckon our Days according to the Place they obtain in the Month.

From this Custom of calling the First Day of every Month the *Kalends* of that Month, we have been led to call those Tables *Kalendars*, in which are set down all the Days of the Year in a regular Disposition according to their Months, each Day of every Week being distinguished from another by one of the First Seven Letters of the Alphabet, viz. *A, B, C, D, E, F, G*, the first of which *A* is placed against the First of *January*, the

Different nations begin the yr at different second times. The ancient *Egyptians* sent its beginning in August; the *Athenians* and *Grecians*, at the Summer Solstice; some places in *Germany* and *Italy* at the vernal equinox. But most of the *Europeans* begin at the 1st of Jan^y

As to our Calendar, as now ordered by the State
act, it keeps the same form, yet it differs in this
particular, that the Golden numbers are set to the
full moon in each month, and not to the change as
formerly; which variation seems to have no manner
of advantage in it, but an manifest disadvantage.
For it is more material to know the moon's change
than the full in every month except march.

To enquire particularly what sort of a year, and
what kind of computation, had been the most
convenient, we shall mention several ways
that it may, or rather might have been ordered.

And 1. As the year consists of 365 days 5 hours
49' very near. It might have been ordered to
consist of 365 days for 3 years, and 366 every
fourth year as the Julian year does. And
placing the odd day at the end of december
beginning the year with January. Or

The Julian account might be preserved, and
the odd day put at the end of February, and
the year to begin at March. Then altering

the dominical letters in Jan^y & Feb^r, so as
to be continued from December in alphabetical
order.

3 The year might have also begun on the
same day of the week, as I suppose on Sunday
which would have much facilitated any com-
putation by the day of the month. But it would
have happened that we should have a leap
have, at the end of the year two Saturdays
and sometimes three. But I know of no
inconvenience this could have been; and
it would have had that advantage that the
1st day of the week would have been the
1st day of the year.

4 But this might at least have been done, by
continuing the Julian year as it was, and
beginning the year at March 1.

For the Julian year is very near the solar
year, and is very commodious for calcu-
lation, being a mean between the astronomical
and tropical years. And is attended with
no other inconvenience, but a small alter-
ation of the seasons, the terms & fairs, &c.
which might have been mended by putting
them forward about a week in 1000 years
by an act of Parliament. Whilst I shift
the year to agree with there is like shifting

Therefore to amaze to save him the labour
of going to it.



second *B* is placed against the Second Day of *January*, the Third Letter *C* against the Third Day of *January*, and so on to the Seventh Letter *G*, which is placed against the Seventh Day of *January*; after which the Letter *A* is placed against the Eighth, the Letter *B* against the Ninth, the Letter *C* against the Tenth, &c. to the End of the Year; whence it comes to pass that whatsoever Letter happens to be placed against any Day of any Week, the same Letter will point out that Day throughout the whole Year: Thus, if the First Day of *January*, against which the Letter *A* is placed be a *Sunday*, all the Days in the Kalendar that have an *A* put to them will be *Sundays*; in like Manner if the Third of *January* against which the Letter *C* is placed, happen to be a *Sunday*, the Letter *C* will point out all the *Sundays* throughout that Year; and this Letter whichsoever it is, is called the *Dominical* or *Sunday Letter* for that Year; and for the same Reason whatever Letter is joined to the first *Monday* in *January*, the same as often as it is repeated in the Kalendar, shews all the *Mondays* in that Year.

But because the common Year consists of 365 Days, which is equal to 52 times 7 and 1 over, hence it is that the Letter that stands against the first Day of the Year, will stand against the last Day; and if the Year begin on a *Sunday* it will end on a *Sunday*, and the first Day of the next Year will be a *Monday*; and

C

the

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The *Sunday* will fall on the Seventh Day of *January*, to which is annexed the Letter *G*, which therefore will be the *Sunday Letter* for that Year; and since the Year began on a *Monday* it will also end on a *Monday*, and the succeeding Year will begin on a *Tuesday*, and the First *Sunday* of the Year will fall on the Sixth of *January*, against which Day is put the Letter *F*, which is the *Sunday Letter* for that Year; and for the same Reason the *Sunday Letter* for the next Year will be *E*, for the Year after that *D*, and thus the *Sunday Letter* will continually change, in a successive but retrograde Order, till it has gone thro' all the Series of Letters, after which it begins again a-new.

If the Year consisted of 365 Days exactly, after a Period of Seven Years, the same Day of each Month would fall on the same Day of the Week; but because of the *Intercalary Day*, every Fourth Year consists of 366 Days, which is equal to 52 Times 7 and two Days over; hence it is that if that Year begin with a *Sunday*, it will end on a *Monday*, and the next Year will begin on a *Tuesday*, and the first *Sunday* of that Year will fall on the Sixth of *January*, to which is annexed the Letter *F*, which will be the *Dominical Letter* for the Year following the *Leap-Year*, whose *Dominical Letter* was *A*; and inasmuch as the *Leap-Year* returns every Fourth Year, the Series of *Dominical Letters* succeeding each other is interrupted

interrupted, and does not return in Order till after Four times Seven or Twenty-eight Years: And hence ariseth the *Cycle* of Twenty-eight Years, which is the *Solar Cycle*, which being compleated, the Days of the Month return in the same Order to the same Day of the Week.

And because in every Fourth Year, the *Intercalary Day* is placed between the Twenty-third and Twenty-fourth of *February*, making thereby two Twenty-fourths of *February*, hence it is that the Twenty-fourth and Twenty-fifth of *February*, according to our way of counting, are esteemed as one and the same Day, and have the same Letter annexed to them, whence the Order of the *Sunday Letter* at that Time is interrupted, and the succeeding Letter takes Place; thus if the *Sunday Letter* be *A*, the Twenty-fourth of *February* will fall on a *Tuesday*, and the Twenty-fifth on a *Wednesday*; and inasmuch as both these Days are marked in the *Kalendar* with the Letter *C*, the following Day, which is *Thursday*, will be marked with the Letter *D*, the next after that which is *Friday* with the Letter *E*, the *Saturday* with the Letter *F*, and the succeeding *Sunday*, which before was marked with the Letter *A*, will now have the Letter *G* annexed to it; which Letter will continue to point out all the *Sundays*, and consequently will be the *Dominical Letter* the remaining Part of the Year; and hence it is that the *Leap-Year* has two

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Dominical Letters belonging to it, the first of which serves from the Beginning of the Year till the Twenty-fourth or Twenty-fifth of *February*, and then the second takes Place and serves for all the rest of the Year.

As the first Year of the *Solar Cycle* was placed in a *Leap-Year*, hence the *Dominical Letters* answering to it are *G* and *F*, whence the *Sunday Letter* for the Second Year of the Cycle will be *E*, for the Third *D*, for the Fourth *C*, and because the fifth Year of the Cycle is a *Bissextile*, the *Dominical Letters* belonging to it will be *B* and *A*, whence the *Dominical Letter* for the Sixth Year will be *G*, and for the rest of the Years of the Cycle as in the following Table.

The T A B L E.

1	GF	5	BA	9	DC	13	FE	17	AG	21	CB	25	ED
2	E	6	G	10	B	14	D	18	F	22	A	26	C
3	D	7	F	11	A	15	C	19	E	23	G	27	B
4	C	8	E	12	G	16	B	20	D	24	F	28	A

Hence the Year of the Cycle being known, the *Dominical Letter* is easily had.

And

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And if the Number of Years elapsed between the Commencement of any *Cycle* and any other given Time be divided by 19, the Quotient will shew the Number of *Cycles* past, and the Remainder the current Year of the *Cycle*.

If the *Cycle* had commenced with the *Christian Era*, that is if the Lettter *F* had been placed in the Ecclesiastical *Kalendar* against the First Day of *January*, then to have found the *Dominical Letter* we had no more to do but to have divided the Year by 28, and the Remainder would have given us the *Dominical Letter* for that Year; but because the First Year of *Christ* happened on the Tenth Year of the *Cycle*, as it had been before settled; therefore,

To find the Year of the *Cycle* of the Sun for any Year of the *Christian Era*.

To the given Year we must add 9 and divide that Sum by 28, then will the Quotient shew the Number of *Cycles* that have revolved since the first Year before *Christ*, and the Remainder if there be any, will shew the current Year of the *Cycle*; but if there be no Remainder, it shews that that Year is the last, or the Twenty-eighth Year of the current *Solar Cycle*: So that if it be required to find what Year of the *Solar Cycle* the Year 1747 is, and what is the *Dominical Letter*.

To the given Year 1747 I add 9, and divide the Sum 1756 by 28, the Quotient 62
shews

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shews me that there has elapsed since the Year before *Christ* 62 Cycles, and the Remainder 20 shews me that it is the Twentieth Year of the current Cycle, whence the *Dominical Letter* will be found to be D.

But the *Dominical Letter* may be directly found without the help of the *Cyclean Table*.

It has been already shewn, that if the Year consisted of 365 Days exactly, after a Period of 7 Years the *Dominical Letters* would return in the same Order, and each Day of the Month would fall on the same Day of Week, and consequently if the Number of Years past from any fixed Time were divided by 7, the Remainder would shew the *Dominical Letter* from the Letter in the fixed Year, in a retrograde Order.

But inasmuch as in every Fourth Year there is an additional Day, therefore to find the Number of Periods of the *Dominical Letter* for any fixed certain Number of Years, we must add to the Number of Years past, (one fourth Part of the same) rejecting the Remainder if any there be, since the additional Year is made at the End of the Fourth Year, and divide the Sum by 7, then the Quotient will shew the Number of Periods, and the Remainder the Surplus: Thus, for *Example*, suppose it were required to find the Number of Periods of the *Dominical Letter* in 1747 Years, to the Number 1747 I add it's Fourth 436 rejecting the
Remainder

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Remainder 3, the Sum 2183 I divide by 7, and the Quotient 311 shews me that there has been so many Revolutions, and the Remainder 6 the Surplus.

Now if the *Solar Cycle* had been made to commence at the same Time with the *Christian Era*, then inasmuch as there is 1747 Years past since the Beginning of the same *Era*, the Surplus 6 would have given us the *Dominical Letter* in a retrograde Order from *A* the first, and consequently the Letter would have been *B*; but because the *Christian Era* commenced in the Tenth Year of the *Solar Cycle*, when the *Dominical Letter* was *B*, therefore if from *E* (exclusive) the *Dominical Letter* for the preceding Year we count 6 the Surplus in a retrograde Order, viz. *F, G, A*, to *D* or from *C*, it's Complement to 7, in a direct Order, as *D, E, F*, we shall have *D* for the *Dominical Letter* for the Year 1747 proposed; wherefore to find the *Dominical Letter* for any other Year since *Christ*.

To the Year add it's Fourth, and divide the Sum by 7, if nothing remain, the *Dominical Letter* is *C*, but if there be any Remainder count it backwards from *C*, or it's Difference from 7 forwards from the same Letter, and you will have the *Dominical Letter*; but because the Letter *C* is the Fourth in the retrograde Order from *G*, the last of the *Dominical Letters*, therefore if to the Year you add it's 4th and 4, and divide that Sum by 7, if nothing

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thing remain the *Dominical Letter* is *G*, but if there be any Remainder it shews the Letter in a retrograde Order from *G*, and being subtracted from 7 will give the Order or Place of the Letter from the Seat of *A*; which Rule is expressed by *Street* in his memorial Verses, thus;

*Divide the Year, it's Fourth and Four by
Seven,
What's left subtract from Seven, the Letter's
given.*

Reckoning for 1 *A*, for 2 *B*, for 3 *C*, &c.

So that if by this Rule it were required to find the Dominical Letter for the Year 1747.

To 1747, add it's Fourth 436, and 4, the Sum 2187, being divided by 7 will give 312 for the Quotient, and 3 for the Remainder, which being subtracted from 7 will leave 4 for the Seat of the Dominical Letter, from *A* inclusive, and consequently the Letter will be *D*.

But because the Dominical Letter in the Second Year of the *Christian Era* was *A*, if from the Year we subtract 1, and to the Remainder add it's Fourth, and divide the Sum by 7, the Remainder if any there be, taken from 9, will give the Dominical Letter counting *A* for 1, *B* for 2, &c. but if there be no Remainder, *A* will be the Dominical Letter.

Thus

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Thus if from 1747 I take 1, it will give 1746, and if to this I add it's Fourth 436, the Sum 2182 divided by 7, will leave 5 for a Remainder, which taken from 9 will leave 4 for the Alphabetical Order of the Letter which therefore must be *D*.

The Dominical Letter being known, it will be easy to find upon what Day of the Week that Year begins, for if the Dominical Letter be *A* the Year begins on a *Sunday*, if it be *B* it begins the Day before *Sunday*, or on a *Saturday*, if it be *C* on a *Friday*, &c. and consequently in the present Case, when the Dominical Letter is *D*, it must begin on a *Thursday*.

Or if the Remainder after the Division of the Year it's Fourth and 4 be reckoned from *Monday*, it will give the same Day; thus in the former *Example*, where the Remainder was 3, it shews that the Year begins the succeeding Day or *Thursday*, and so for the rest; and by proceeding after this manner, we may easily find upon what Day of the Week the first Day of every Month will happen, and consequently upon what Day in the Week any Day in the Year will fall.

As the periodical Returns of the Sun and Moon are found to be constantly the same, the Moon moving with near thirteen times the Velocity of the Sun; hence it must come to pass that after a certain Number of Revolutions they must necessarily meet in the same Point of the Heavens, and this was first pronounced by

D

Meton

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Meton the Athenian, to happen once in Nineteen Years, and is therefore called the *Metonic Cycle*, and was of great Use among the Ancients, for adjusting of the times of the New and Full Moons.

For inasmuch as according to this Period the New and Full Moons happen on the same Day, and at the same time of that Day, after a Space of 19 Years, if the time of the New and Full Moons be had for any Term of 19 Years, the times of the New and Full Moons for any Year past or to come is given also.

And therefore at the Time of the Council of *Nice, a Town in Asia Minor* *Nice* in the Year 325, when they were about settling the Time for the Celebration of *Easter*, this Cycle was had in so great Esteem, that they founded their Ecclesiastical Computation upon it, and finding by Observation that in the first Year of the Cycle the New Moons happened upon the Twenty-third of *January*, the Twenty-first of *February*, the Twenty-third of *March*, &c. against those Days in the first Column of the Kalendar they put the Number 1, and finding that in the Second Year of the Cycle, the New Moons happened upon the Twelfth of *January*, the Tenth of *February*, the Twelfth of *March*, &c. against those Days in the Kalendar they writ the Number 2, and against the First of *January*, the Third of *February*, the First of *March*, &c. on which Days they observed the New Moons to be celebrated, in the Third Year of the Cycle they annexed *heresy in 325* and it was the residence of the Greek Emperor after the Taking of Constantinople by the *Turks*.

annexed the Number 3; and after the same manner to every Day in the Year during the whole Cycle on which they found the New Moon to happen, they inscribed the Number answering to the current Year of the Cycle; whence it comes to pass that by knowing in what Year of the Cycle any Year happened, the Days on which the New Moons happened during that whole Year, were had by Inspection, for by finding the Year of the Lunar Cycle in the first Column of every Month in the Kalendar, against that Number we shall have the Day of that Month on which the Change of the Moon happens, and for this excellent Use of these Numbers they were wont to be set in *Golden Letters* in the Kalendar, and from them the Year of the Cycle for any Year was called the *Golden Number* of that Year, but in our *Liturgy* it is called the *Prime*.

And in order to find the Year of the Cycle or the *Golden Number*, divide the Year of the *Julian Period* (which will be explained hereafter) by 19, and the Remainder will shew you what Year of the Cycle the current Year is; but because the first Year of the *Christian Era* happened in the Second Year of the Lunar Cycle, therefore if to the Year from *Christ* be added 1, and that Sum be divided by 19, the Quotient will shew how many Cycles have revolved since the Commencement of the *Christian Era*, and the Remainder will shew what Year of the Cycle the given Year is; but if nothing re-

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main then the given Year is the last Year of the Cycle, and the *Prime* or *Golden Number* is 19.

And hence we are taught a ready way of finding on what Day of any Month, in any Year the New Moon will happen, for by finding the *Prime* or *Golden Number* for that Year, and searching for that Number in the first Column of the given Month in the Kalendar, right against it will stand the Day of the Month required.

As suppose it were required to find on what Day of *March* in the Year 1747 the New Moon will be celebrated.

To the given Year 1747 add 1, and divide the Sum 1748 by 19, the Remainder 19 shews that it is the Nineteenth Year of the Lunar Cycle, and that therefore the *Prime* or *Golden Number* is 19.

Entering therefore the first Column of the Month of *March* in the Kalendar, with the Number 19, I find it to stand against the Fifth Day, which shews that upon that Day the Moon changes: After the same Manner by seeking for the same Number 19 in the first Column of the Months of *January*, *February*, *April*, &c. I find that according to this Computation the New Moons happen the Fifth of *January*, the Third of *February*, the Fourth of *April*, &c. and hence the Day of the Month being known, the Age of the Moon on that Day was known also.

Hence

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Hence we are taught a very ready way of finding in what Month, and on what Day of the Month, *Easter Day* falls on in any Year, according to the Decree of the *Nicene Council*, which was first that *Easter Day* should be celebrated after the *Vernal Equinox*, which then happened upon the Twenty-first Day of *March*, secondly, that it should be kept after the Fourteenth Day of that Moon, which should happen after the Twenty-first of *March*; and thirdly, that the *Sunday* immediately following that Fourteenth Day should be *Easter Sunday*; so that if it be required to find in what Month and on what Day of the Month *Easter Day* will happen in the Year 1747 of the *Christian Era*;

I search for the *Golden Number* 19 in the first Column of the Month of *April* in the *Kalendar*, and find that it stands against the Fourth Day of the Month, counting therefore from thence 14 Days inclusive, I find that the *Paschal Full Moon* happens upon the Seventeenth Day of *April*, against which stands the Letter B, and because the *Sunday Letter* for the same Year is D, it shews the next Day but one, or the Nineteenth of *April* is *Easter Day*. Again,

Suppose it were required to find on what Day of the Year *Easter Day* falls in the Year 1758, when the *Golden Number* is 11, and the *Dominical Letter* D.

Entering

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Entering the Kalendar in the Month of *March*, I find the Number 11 to stand against the Third Day, from which reckoning 14 Days I find that the next *Full Moon* happens on the Seventeenth Day of the same Month, which because it precedes the Twenty-first Day, I search again in the next Month, and find that the Number 11 stands against the Second Day of *April*, which is therefore the Day of the Commencement of the *Paschal New Moon*, from whence counting 14 Days, I find that the *Paschal Full Moon* happens on the Sixteenth Day of *April*, against which stands the Letter *A*, but because the Dominical Letter is *D*, therefore *Easter Day* falls upon the Nineteenth Day of the same Month *April*; and this *Rule* is still kept by our *Church*, which ordains that *Easter Day* is always the first *Sunday* after the first Full Moon which happens next after the Twenty-first Day of *March*; and if the Full Moon happens upon a *Sunday*, *Easter Day* is the *Sunday* after; where it is to be understood,

1. That in *Leap-Year* instead of the Twenty-first of *March*, we must use *March* the Twentieth.

2. That the Full Moon meant is the Fourteenth Day of the Moon, according to the Kalendar in the *Common Prayer Book*, counting that Day for the first of the Moon which hath the Golden Number of the Year collateral

lateral to it in the first Column of the said Kalendar. And,

3. That These Words (*next after the Twenty-first of March*) are meant inclusive, as if it had been said (*next after the Commencement of March the Twenty-first*) so that if the Full Moon happens on *March the Twenty-first*, the same must be the *Paschal Full Moon*; whence it comes to pass that as the *Paschal Full Moon* can never happen before the *Twenty-first of March* and after the *Eighteenth of April* inclusive, *Easter Day* can never happen sooner than the *Twenty-second of March*, nor later than the *Twenty-fifth of April* inclusive.

As the Lunar Synodical Month consists but of 29 Days, 12 Hours, 44 Minutes, 3 Seconds; therefore 235 Lunations, which are the Number of Lunations that happen in 19 *Julian Years*, are performed in 6939 Days, 16 Hours, 31 Minutes, 45 Seconds; whereas 19 *Julian Years* are equal to 6939 Days and 18 Hours, so that 235 Lunations are less than 19 *Julian Years*, by 1 Hour, 28 Minutes, 15 Seconds; and consequently, the New Moons after 19 *Julian Years*, will not return to the same Hour of the Day, but will happen 1 Hour, 28 Minutes, 15 Seconds sooner, which in the Space of 310 Years will amount to one entire Day, whence it comes to pass that in the Space of 310 Years, the New Moons will anticipate
one

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one Day; and consequently since the time of the *Council of Nice* which was in the Year 325, that is during the Space of 1422 Years they have anticipated above four Days and a half, so that if in the Year 325 when the Kalendar was first composed, the New Moon happened upon the First of *March*, which by the *Church Kalendar* it appears to have done, in the Year 1747 it will happen between the Twenty-fourth and Twenty-fifth of *February*, and in the first Year of the *Christian Era* it was celebrated upon the Second of *March*.

And inasmuch as the Compilers of the Kalendar did not so much conform themselves to the *Astronomical* Methods of computing the New Moons, as they did to the Custom of the *Jews*, who followed the vulgar way of Reckoning, and counted the Age of the Moon not from the time of it's Conjunction with the Sun, but from the first Day of it's Appearance, which could never happen till the next Day after the Change, hence the times set down in the Kalendar, are later than the true times by 5 Days and a Half, and will continue to fall later a Day in 310 Years, so that in the Year 1875 they will happen Six Days later than the true and *Astronomical* New Moon, and are therefore for Distinction sake called the *Ecclesiastical New Moons*.

Wherefore inasmuch as the times of the New Moons pointed out by the Kalendar, were not the times when the New Moons happened,
but

but the times the Moon first appeared, which was the first Day after the Change, or when she was one Day old ; therefore if from the Time of the Ecclesiastical New Moon be taken 5 Days and a Half, it will shew the Time of the Astronomical New Moon at this time ; thus the time of the Astronomical New Moon in *April* 1747, will be found by reckoning 5 Days and a Half backward from the Fourth Day of *April*, which is the time of the Ecclesiastical New Moon in the Kalendar, to happen between the 29th and 30th Day of *March*, which agrees as near as such a manner of computing can well do, for the true Astronomical New Moon happens on the 29th Day, at 8 Hours, 32 Minutes nearly.

'Twas in Conformity to the Custom of the *Jews*, who were commanded by *God* himself (as we may read in the Twelfth of *Exodus* and at the Sixth *Verse*, and again in the Twenty-third of *Leviticus* and at the Fifth *Verse*) to celebrate the *Passover* in the first Month, and on the Fourteenth Day of that Month in the Even, that our Primitive Fathers ordered that the Fourteenth Day of the Moon from the Kalendar New Moon, which immediately follows after the Twenty-first of *March*, at which time the *Vernal Equinox* happened upon that Day should be deemed the *Paschal Full Moon*, and that the *Sunday* after (because our *Saviour* rose upon the Day after the *Jewish Passover*) should be *Easter Day*, and 'tis upon this Account that our *Rubric* has appointed it upon the

E

First

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First *Sunday* after the First Full Moon (because the Fourteenth Day of the *Jewish* as well as the *Ecclesiastical Moon*, was the Fifteenth Day of the *Astronomical Moon*, and consequently the Day of the Full Moon itself) immediately following the Twenty-first Day of *March*, upon which Day at that time the *Vernal Equinox* happened; whence it appears that the true time of celebrating *Easter*, according to the original Institution of the Feast of the *Passover*, as well as according to the Intent of the Council of *Nice*, was to be the first *Sunday* after the First Full Moon immediately following the *Vernal Equinox*, or when the Sun entered into the First Point of *Aries*; and this was the principal View (that is the Celebration of *Easter* according to the Intent and Meaning of the *Nicene Council*) that Pope *Gregory* had, when he reformed the Kalendar, tho' he missed his Aim, and is what the *Protestant* Body in *Germany*, happily accomplished in the Year 1700, when they conformed themselves to the *Gregorian Year*, and 'tis for want of this Reformation in *England*, that in this present Year 1747, we celebrate *Easter* on the 19th of *April*, when in reality, and according to the original Institution, it ought to be kept on the 22^d of *March* Old Stile, upon which Day it is observed in all the *Christian Churches* where the New Stile is received.

It has been already shewn (in Page the 11th) that the Solar Year exceeds the Lunar Year

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Year by 10 Days, 21 Hours, 0 Minutes, 19 Seconds, or 11 Days nearly, these therefore are called the *Intercalary Days* or *Epaëts*, and are of very great Use in adjusting the Length of the Lunar Year to the Solar, and in finding how long time has elapsed from the preceding Conjunction in any Lunation, at any time proposed, which is called the *Age of the Moon* at that time.

For inasmuch as the Lunar Year is less than the Solar Year by 11 Days in round Numbers, if the Sun and Moon happen to be in Conjunction on the last Day of any Year, at the End of the next Year the Moon will be past the Conjunction by 11 Days nearly; at the End of Two Years it will want 22 Days; but because at the End of Three Years it amounts to 33 Days, it shews that in that Year there has been 13 Conjunctions or New Moons and Three Days over; whence it appears that at the End of the Fourth Year, the Moon will be past the Conjunction 14 Days; at the End of the Fifth Year 25 Days, &c. constantly increasing by Eleven Days *per Annum*, till after the End of Nineteen Years it becomes the same as it was Nineteen Years before; and the same Series of *Epaëts* return, and the Day of the Lunation is the same as formerly.

Hence it appears that the *Epaëst* for any Year being known, the *Epaëst* for any Year past or to come may be found readily, for if the Lunar Cycle happen to commence from

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that Year in which the Conjunction of the Luminaries, or the time of the New Moons happened on the last Day, or on the Thirty-first Day of *December*, of the preceding Year, then the *Epaēt* for the First Year of the Cycle will be 11, for the Second Year 22, for the Third Year 3, for the Fourth Year 14, for the Fifth Year 25, &c. constantly increasing by 11; hence it is manifest, that to find the *Epaēt* for any Year of the Cycle, we have no more to do, but to multiply the Year of the Cycle (which is called the *Golden Number* for the current Year of *Christ*) by 11, and divide the Product by 30, and the Quotient if there be any, will shew how many *Embolimæan* or *Intercalary Months* has happened since the First Year of the Cycle, and the Remainder the *Epaēt* for that Year, or Number of Days between the last Day of the former Year, and the immediate preceding Conjunction or New Moon: Thus if it be required to find the *Epaēt* for the given Year 1747, or Number of Days elapsed between the Thirty-first Day of *December* 1746, and the Day of the immediate preceding New Moon, because the given Year 1747 is the Nineteenth Year of the Cycle, that is the *Golden Number* for the 1747th Year of the *Christian Era*, I multiply the *Golden Number* 19 by 11, and because the Product 209 exceeds 30, I divide it by 30, and the Quotient 6, shews me that there has been 6 *Intercalary Lunar Months* since the Commencement
of

of the Cycle which was in the Year 1728, and the Remainder 29, shews me that on the Thirty-first Day of *December* 1746, the Moon was 29 Days past the Conjunction, and that therefore the *Epaet* for the present Year 1747 is 29.

And hence we are taught how to find on what Day of any Month the New Moon will happen.

For inasmuch as the *Synodical Month*, or time between any two immediate Conjunctions of the Luminaries is equal to 29 Days, 12 Hours, or 29 Days and a Half, and that the *Epaet* for any Year shews us how many Days are elapsed between the last Day of the preceding Year and the next preceding Conjunction to that Day, if from 29 Days and a Half be substracted the *Epaet* for any Year, the Remainder will shew us on what Day in *January* the next New Moon will happen; and because the Month of *January* consists of 31 Days, which is more than the *Synodical Month* by one Day and a Half, if to the *Epaet* for the Year, we add 1 Day and a Half, and substract that from 29 Days and a Half, we shall have the Day of the New Moon in *February*, and because in common Years the Months of *January* and *February* do make up just two *Synodical Months* or 59 Days, the *Epaet* for the Year will shew how many Days it is past the New Moon on the last Day of *February*, and being therefore taken from 29 Days and a Half, will
give

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give the Day of the New Moon in *March*; and thus by increasing the *Epaēt* continually, by the Excess of the Month above a Synodical Month, and subtracting that Sum from the Length of the Synodical Month, we shall have the Day of the Change in any Month, and by adding 14 Days and 3 Quarters to the Time of the New Moon, we shall have the Day when the Full Moon will be celebrated; but to avoid Fractions, in the common Method of Calculation, they allow 30 Days to the Synodical Month, and for *February* they allow 2, for *March* 1, for *April* 2, for *May* 3, for *June* 4, for *July* 5, for *August* 6, for *September* 8, for *October* 8, for *November* 10, and *December* 10, and make the *Epaēt* to take Place on the First of *January*; and by proceeding after this manner we shall find the New Moon in *January* 1747, to happen on the Twenty-ninth Day; in the Month of *February* in the same Year, on the Twenty-eighth; in the Month of *March*, on the Twenty-ninth; in the Month of *April*, on the Twenty-eighth; in *May*, on the Twenty-eighth; in *June*, on the Twenty-sixth; in *July*, on the Twenty-sixth; in *August*, on the Twenty-fourth; in *September*, on the Twenty-eighth; in *October*, on the Twenty-second; in *November*, on the Twenty-first; and in *December*, on the Twentieth; which seldom differ above half a Day from the true Conjunction, and sometimes agree pretty well with it, and are therefore exact enough for common Use:
And

And if to each of these Times thus found, we add 15 Days, we shall have the Times of the succeeding Full Moons.

And inasmuch as the *Epaēt* for the Year as has been before taken Notice of, shews us how many Days has happened between the last Day of the preceding Year, and the immediate preceding New Moon, and is therefore equal to the Age of the Moon at that time, if it be required to find the Age of the Moon any Day in *January*, we have no more to do but to add the Day of the Month to the *Epaēt*, and the Sum if it be less than 30, will shew the Moons Age; but if the Sum be more than 30 the Excess above 30 will give the Age of the Moon; thus in the Year 1723, when the *Epaēt* was 4, the Moon will be found to be 24 Days old on the Twentieth of *January*, but on the Twenty-eighth of the same Month it will be found to be 2 Days old, since 4 and 28 makes 32, which exceeds the Synodical Month by 2, and if to the same *Epaēt* we add two for the Month of *February*, 1 for the Month of *March*, 2 for *April*, &c. we shall have the Age of the Moon at the Beginning of every Month, and if to that Sum therefore be added the Day of the Month when the Age is required, if the Sum be less than 30 it will be the Moon's Age, but if it be more than 30, then the Excess above 30 will give the Age required; as is abundantly manifested from what has been said.

But

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But because the New Moons do not return at the End of Nineteen Years, exactly at the same time of the Day, but 1 Hour and 28 Minutes nearly sooner than they did before, and that of Consequence in 310 Years they will anticipate one whole Day; hence it comes to pass that the *Annual Epact* itself varies, and that in the Space of 310 ^{Years} ~~Days~~ it will be increased one Day; so that if I was to find the Age of the Moon on any Day of the Year 325, to which the *Ecclesiastical Kalendar* is fitted, when according to the common Method of Computation the *Epact* is 3, instead of saying add to the *Epact* the Day of the Month, and for *January* 0, for *February* 2, for *March* 1, for *April* 2, &c. we must say, add to the *Epact* the Day of the Month, and for *January* subtract 4, (because of the Anticipation which is Four Days since that time) for *February* 2, for *March* 3, for *April* 2, for *May* 1, for *June* 0, and for *July* add 1, &c. and if we were to find the Age of the Moon in the first Year of *Christ*, which was 324 Years before that, we must say, subtract 5 for *January*, 3 for *February*, &c. or, which is the same thing, we must find the proper *Epact* for that Year by subtracting 4 from the *Epact* found after the common Method, which reduced it to 28, and 5 from 22 the *Epact*, for the first Year current of *Christ*, which will give us 17 for the *Epact* for that Year, and then we must proceed as before. In like manner,

manner, if we were to find the Age of the Moon in any Month of the Year 2000, when the *Epaēt* according to the common Method of Computation is 6, we must either add 1 to the *Epaēt* found, which will give us 7 for the true *Epaēt* for that Year, and then proceed according to the *General Rule*; or else if we will make Use of the *Epaēt* 6, we must say, instead of adding for *January* 0, for *February* 2, for *March* 1, &c. we must say, for *January* add 1, for *February* 3, for *March* 2, &c. and the same *Law* must be observed at all other different Times: Thus the Age of the Moon on the First of *February* in the Year 13, will be found to be 2 Days, on the First of *February* 1723 it will be found to be 7 Days, and on the First of *February* 1951 it will be found to be 8 Days; in each of which Years, the *Epaēt* according to the common Method of Computation will be 4.

By the help of the *Epaēts* thus determined, may the time of the *Paschal Full Moon* be found, and from thence and the *Dominical Letter* the Day on which *Easter* happens.

For inasmuch as in the present Age, the *Epaēt* is equal to the Age of the Moon, on the last Day of *February* save one, if we take the *Epaēt* from 28, the Remainder will shew us on what Day in *March* the *Astronomical New Moon* will happen, and if to this we add 15, the Sum will give us the Day of the

F Astro-

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Astronomical Full Moon ; and because the *Astronomical Full Moon* is 4 Days sooner than the *Ecclesiastical Full Moon*, if to the last Sum we add 4, we shall have the Day of the *Ecclesiastical Full Moon*, which is usually called *Easter Limit* ; that is, if from (the Sum of 28, 15, and 4 which is equal to) 47, we take the *Epaēt* for the Year, the Remainder will give us the Day of the *Ecclesiastical Full Moon* or *Easter Limit*, reckoned from the First of *March* inclusive; thus in the Year 1723, when the *Epaēt* was 4, *Easter Limit* will be equal to 47 less 4, equal to 43 ; so that the *Ecclesiastical Full Moon* falls on the Twelfth of *April*, and because the *Sunday* next succeeding the *Limit* is *Easter Day*, and the *Dominical Letter* standing against the First of *March* in the *Kalendar* is *D*, if we count the Number of Letters between *D* and the *Dominical Letter* for the given Year in a direct Order, it will shew us how many Days after the *Paschal Full Moon Easter Day* happens, this being therefore added to the Day of the *Paschal Full Moon*, will shew us on what Day of the Month *Easter Day* falls ; thus because in the Year 1723, the *Dominical Letter* was *F*, which is the second Letter in the Alphabetical Order from *E* exclusive, if we add 2 Days to *Easter Limit* which is 43, the Sum 45 reckoned from the First of *March* inclusive, or if we count 2 Days from the Twelfth of *April* exclusive, which is the Day of the *Paschal Full Moon*, it will

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will give us the Fourteenth Day of *April* for *Easter Day*; but inasmuch as the Letter *D* which stands against the First of *March* in the Kalendar, is the Fourth Letter in the Alphabet; if to the *Dominical Letter* for the given Year be added 4, if the Sum be less than 7, it shews us on which Day of the Month the First *Sunday* in *March* falls; if the Sum be greater than 7 it shews on what Day of the Month the Second *Sunday* happens, this therefore taken from *Easter Limit*, shews us how many Days it is from that *Sunday* to the *Paschal Full Moon*, this Remainder therefore taken from the next greatest Number of Sevens, will shew us the Number of Days between the *Paschal Full Moon* and the succeeding *Sunday*, which therefore being added to *Easter Limit*, will shew us in how many Days from the First of *March* inclusive, and consequently on what Day of the Month *Easter Day* falls. Thus,

In the former *Example*, where the *Dominical Letter* is *F*, if to the Number 6, which answers to the Seat of this Letter in the Alphabet, be added 4, the Sum 10 shews us that the Second *Sunday* in *March* happens on the Tenth Day; this therefore taken from 43 which is *Easter Limit*, will give 33 for the Number of Days between the Second *Sunday* and the *Paschal Full Moon*, this last Remainder 33 therefore taken from 35 the next greater Number of Sevens, will leave 2 for

F 2

the

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the Number of Days between the *Paschal Full Moon* and *Easter Day*, the same as was before determined; whence it follows, that *Easter Day* will happen on the Fourteenth of *April*.

But when the *Epaet* is 28 or 29, if it be taken from 28, it will give us the New Moon in *February*, which therefore cannot in this Case be the *Paschal New Moon*; so that we must add 30 Days to the Time thus found, or, which is the same thing, instead of taking the *Epaet* from 47, we must take it from 47 more 30 or 77, and the Remainder will give us the true Time of the *Paschal Full Moon* or *Easter Limit*, reckoned from the First of *March* inclusive, whence the Day on which *Easter* falls may be determined by the former Rules, and the same Law will hold good for any Time past or to come.

Thus at the Time of the *Council of Nice* which was held in the Year 325, when the *Epaet* was 3 and the *Dominical Letter* C, if from 47 be taken 3, the Remainder 44 shewed that the *Ecclesiastical*, which at that Time was the *Astronomical*, *Full Moon*, happened on the Thirteenth of *April*, when the *Dominical Letter* being C, *Easter Day* was the Fifth Day following, or the Eighteenth Day of the same Month: For inasmuch as the New Moon happened in this Month upon the First and Thirty-first Day of the Month, the latter of which was the *Paschal New Moon*,
and

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and since this must be 44 Days from the First of *March* inclusive, and the *Epact* at that time being 3, the fixed Number for finding *Easter Limit* by the *Epact* must at this time be 47, equal to the Sum of 44 and 3, and the same will hold good throughout all the Cycles of the *Epact*.

But if instead of these fixed and settled *Epacts*, we should make Use of the true *Epacts* or Ages of the Moon upon the last Days of *December* and *February*; then the Numbers 47 and 77 must be increased by Unity for every 310 Years after the Sixteenth Century, and diminished by the same Quantity for every Three Centuries backward from the same Time: Thus in the Year 325, if I make Use of the true *Epact* or Age of the Moon upon the last Day of *February*, which is 29, then instead of the Number 47 and 77 I must use the Fixed Number 43 and 73, and the same Limits will be produced.

And after this manner may the Time when *Easter* falls (upon which all the moveable Feasts and Terms depend) according to the Supputation of the *Church of England* be found, for any Time past or to come independently, without the help of Tables or *Kalendars*, by Addition and Subtraction only.

Sir *Isaac Newton*, in his Account of the Time of the Birth and Passion of *Christ* printed in the Year 1733, takes Notice that the *Christians* of the First Age had little Regard
to

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to the Times of the Birth and Passion of *Christ*, being not material to Religion, and they who first began to celebrate them, fixed them in the cardinal Periods of the Year, as the Annunciation on the Twenty-fifth of *March*, which was the Vernal Equinox when *Julius Cæsar* corrected the Kalendar, the Feast of *St John* on the Twenty-fourth of *June* which was the Summer Solstice, the Feast of *St Michael* on *September* the Twenty-ninth which was the Autumnal Equinox, and the Birth of *Christ* on *December* the Twenty-fifth the Day of the Winter Solstice, the Feast of *St Thomas* on *December* the Twentieth, and that of *St Matthias* on the Twenty-first of *September*, and the rest of the other Saints on the Sun's Entrance into the several Signs, as the Conversion of *St Paul* on *January* the Twenty-fifth, about which Time the Sun then entered unto *Aquarius* which happens this Year according to our Style on the Ninth; the Feast of *St Matthias* on *February* the Twenty-fifth when the Sun entered into *Pisces*, which now happens on *February* the Eighth; *St Mark* on *April* the Twenty-fifth when he entered *Taurus*, now the Tenth; *Corpus Christi* on *May* the Twenty-sixth, now the Eleventh, when he entered *Gemini*; *St James* on *July* the Twenty-fifth, now the Twelfth; *St Bartholomew* on *August* the Twenty-fourth, now the Twelfth, when he entered *Virgo*; *St Simon* and *St Jude* on *October* the Twenty-eighth,
now

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now the Twelfth, when he entered *Scorpio*, and where there were any other remarkable Days in the Kalendar, they placed the Saints upon them, as *St Barnabas* on *June* the Eleventh; *St Philip* and *St Jacob* on the First of *May*, a Day dedicated to the Goddess *Flora*, and is still celebrated with her Rites, for as there were no certain Traditions about the Year of *Christ*, they consulted the Mathematicians who being acquainted with the Motions of the Heavenly Bodies, fixed them at such Times as by the Course of the Sun might be always kept upon the Day they intended for it.

So that by this Account it appears that in the present Year 1747, the Conversion of *St Paul* should be kept on the Ninth of *January*; the Feast of *St Matthias* on *February* the Eighth; *St Mark* on *April* the Tenth; *Corpus Christi* on *May* the Eleventh; *St James* on *July* the Twelfth; *St Bartholomew* on *August* the Twelfth; *St Simon* and *St Jude* on *October* the Twelfth; and the Feast of the *Nativity*, or *Christmas Day*, on *December* the Eleventh according to our Style.

He places the First Passover in the Sixteenth Year of *Tiberius*, in the Year of the Julian Period 4728, between the Baptism of *Christ*, and the Imprisonment of *John*; the Second, within Four Months after the Imprisonment of *John*, and *Christ*'s beginning to preach in *Galilee*; the third was the next Feast after that, when

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when the Corn was eared and ripe; the Fourth was when *Christ* wrought the Miracle of the five Loaves; and the Fifth was that in which *Christ* suffered; from whence he concludes that the Crucifixion happened in the Year 34 from the Incarnation, which is a Year posterior to the common Opinion of the generality of Writers before that Time.

I find by Calculations made from the best Solar Tables, that in the first Year after the Reformation made by *Julius Cæsar*, which was 45 Years before *Christ* in the 4669th Year of the Period called after his Name, that the Vernal Equinox happened on the Twenty-third of *March*, at 52 Minutes after Five in the Afternoon; that in the First Year of *Christ*, it fell on the Twenty-third Day of *March*, at 35 Minutes after 9 in the Morning; that the Winter Solstice, the Time set apart for the Observation of the Nativity, was on *December* the Twenty-fourth Day, at 44 Minutes after 1 in the Afternoon.

In the Year 33 the Year of the Passion, the Equinox fell on the Twenty-third Day of *March*, at 42 Minutes after 3 in the Afternoon.

In the Year 325, when the Council of Nice met, the Equinox happened on the Twenty^{second} Day of *March*, at 55 Minutes after Nine in the Morning.

In the Year 1582, when Pope Gregory * altered the Year, the Vernal Equinox fell on

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* It is strange that the people should bring back the beginning of the year only to the nicean Council; when it ought to have been brought back to the time of *Julius Cæsar* 46 years before the when the error was first begun; at which time the vernal equinox was on the 24 or 25th of *March*.

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the Eleventh Day of *March*, at 33 Seconds after Six in the Morning.

And in this present Year 1747, it happens on *March* the Ninth, at 37 Minutes, 16 Seconds after 11 in the Evening.

It appears from the preceding Calculation, that the Difference between the true Time of the Winter Solstice in the First Year of the Christian Era, and the reputed Solstice is nearly Two Days, which in the Course of 1746 Years, amounts to an annual Error of about one Minute and a Half, which is next to nothing considering the State Astronomy was in at that Time.

The true Length of the Solar Year is 365 Days, 5 Hours, 48 Minutes, and 57 Seconds, equal to 8765 Hours, 48 Minutes, and 57 Seconds, equal to 525948 Minutes, and 57 Seconds, equal to 31556937 Seconds.

The true Solar Year is short of the Julian Year by 11 Minutes and 3 Seconds, so that in 130.3167 Years, or 130 Years, 7 Hours, and 36 Minutes, the Year will anticipate one whole Day, and consequently if the Sun be in 22° , $2'$, $27''$, on the First of *January* 1747, after 130 Years, 7 Hours, and 36 Minutes, that is in the Year 1877, on the Thirty-first of *December*, at 4 Hours 24 Minutes in the Morning, it will be in the same Place in the Ecliptick; so that after this Method of Computation, if the Sun enters the Vernal Equinox this present Year on *March* the Ninth,

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Must then instead of 10 days; 13, or 14,

should have been cut off. This year was brought into use in England in 1752; before which the Julian act was always used. It was effected by striking out 11 days in September calling the 3^d day the 14th and so on. And the year to begin 1st Jan.

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at 37 Minutes, 16 Seconds after Eleven in the Evening; in the first of *Christ* he must have entered it on *March* the Twenty-third, at 10 Minutes, 34 Seconds after Nine in the Morning, differing but 24 Minutes, 26 Seconds deduced from the former Calculation, which is scarce 1 Second *per Annum* in the Motion of the Sun, agreeing very near with each other, and by taking the Mean between them, it will make the Vernal Equinox to happen on *March* the Twenty-third, at 22 Minutes, 47 Seconds after Nine in the Morning, whence it may be justly concluded that all the other Determinations are sufficiently exact.

From the Cycles of the Sun and Moon (already explained) multiplied into one another, arises a third Period of 532 Years (for $28 \times 19 = 532$) which is called the *Victorian* or *Dionysian Period*, after the Completion of which *Period*, not only the New and Full Moons return to the same Days of the Month, but also the Days of the Month return to the same Days of the Week, and therefore the Dominical Letter and the moveable Feasts return again in the same Order; whence this Cycle is called the great *Paschal Cycle*. And

To find the Year of the *Dionysian Period* for any Year of *Christ*, to the Current Year add the Number 457, the Year of that Cycle when the *Christian Era* commenced, and divide the Sum by 532, the Remainder after the Division is the Year of the Period; thus the
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present

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present Year 1747 will be found to be the 76th of the *Victorian Period*.

Besides the Cycles of the Sun and Moon, there is another Cycle which the *Romans* made Use of, consisting of 15 Years, which is called the Cycle of Indiction, having no Connection with the Cœlestial Motion, and was instituted as some suppose (tho' the true Reason does not appear) for the sake of a certain Tribute, and was by the Command of *Justinian* the Emperor, inserted in their publick Instruments, and is made Use of at this Day by the Popes of *Rome* in their *Bulls, Diplomas, &c.* and commenced with them at the Kalends of *January*, but the *Romans* made it to commence at different Times of the Year.

And inasmuch as the first Year of the *Christian Era* happened in the fourth Year of this Cycle, therefore to find what Year of the Cycle corresponds with any Year of *Christ*, to the given Year add 3 and divide by 15, the Remainder will shew what Year of the Cycle it is; thus the Year 1747 will be found to be the 10th Year of the Cycle.

From the Multiplication of these three Cycles, *viz.* the Lunar of 19 Years, the Solar of 28 Years, and the Indiction of 15 Years, arises the great *Julian Period* consisting of 7980 Years; this Period is supposed to have it's Beginning 764 Years before the *Creation*, when all the 3 Cycles began together, and is not yet compleated; and therefore it comprehends all

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other Periods, Cycles, and Epoch's: There is but one Year in the whole Period which has the same Numbers for the three Cycles of which it is made up, and therefore if the *Historians* had remarked in their Annals the Cycles of each Year, there had been no Dispute about the Times of any Action.

The Year before *Christ* happened in 4713 Year of the *Julian Period*, therefore to find what Year of the *Julian Period* any current Year answers to; to the current Year of *Christ* add 4713, the Sum will be the Year of the *Julian Period*; thus the Year 1747 will be found to be the 6460th Year of the *Julian Period*.

These are the chief and most remarkable Periods, but there were several others made Use of, such as was the Year of the *Jubilee* among the *Jews*, which consisted of Seven Sabbatical Years, and returned in the Space of 49 or 50 Years. The *Olympiads* among the *Grecians*, which consisted of Four Years, and the great *Platonic Year*, so celebrated among the *Historians*, which contained an entire Revolution of the Stars to the same Point in the Heavens from whence they set out, and this consists of 25920 Years.

As in the Heavens there are certain fixed Points from which *Astronomers* begin their Computations, so also there are certain Points of Time from whence *Historians* begin to reckon; and these Points or Roots of Time are called

What year of the Julian period answer to 1774 of the Christian Era?

The Julian period began 4713 years before Christ

∴ to 1774
add 4713

Ans^r 6487 year Julian period

What year of Christ answer to the 4635th of the Julian period?

But because the year of Christ 4635
is running backward, $- 4713$
it will be the 79th year current $- 78$ years complete
before Christ.

What year of the Era of Nabonassar answer to 1774 of the Christian Era?

The Christian Era began 747 years after that of Nabonassar.

to 747
add 1774

2521 year

What year of Christ answer to the 20th of Nabonassar?

20
 $- 747$

- 727 years complete

before Christ

728 years current

What year of the Hegira of the Turks
answer to the 30th year before the Yezdegird
of the Persians?

The Hegira began 10 years before the
Yezdegird from 30
 take 10
 20 year current or 1
 complete

In using any period, if the number be more
than the period; divide by that period and
the remainder is the n^o of the year.

Before 1582 there was no Gregorian year
and 46 years before Christ there was no Julian
year.

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called Epoch's or Era's, from which we generally count our Years and Time, and in which all memorable Actions are disposed and recorded according to the Series of Years which followed from that Root, the most ancient is that of the *Creation of the World*, 3950 Years before *Christ*; the next is that of the *Deluge* 2956 Years before *Christ*; and the third is that of the *Olympiads*, which commenced in *Greece* 776 Years before *Christ*, and in the 3938th Year of the *Julian Period* when the Solar Cycle was 18, the Lunar Cycle 5, and the Roman Indiction 8.

The next and most remarkable Epoch, is that of the building of *Rome*, in the Spring, about the End of the Third Year of the Sixth *Olympiad*, 753 Years before *Christ*, in the 3961st Year of the *Julian Period*, the Cycle of the Sun being 13, the Cycle of the Moon 9, and the Indiction 1.

The next and most celebrated Era was that of *Nabonassar* King of *Babylon*, so famous among the *Astronomers*, being made Use of by *Ptolomy*, *Albategnus*, *Alphonsus*, *Copernicus*, and others, as a very proper Era for computing the Motions of the Stars from; it began according to *Ptolomy*, on the Fourth of the *Kalends of March*, being *Wednesday*, 747 Years before *Christ*, in the 3967th Year of the *Julian Period*; the First Year of the Eighth *Olympiad*, and in the Sixteenth Year of the building of *Rome*, when the Solar Cycle was

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was 19, the Lunar Cycle 15, and the Indiction 6.

Next after this we have the Epoch of *Alexander the Great*, 424 *Egyptian* Years after the *Nabonessarean Era* began, for *Alexander* died at *Babylon* in the Thirty-third Year of his Age, in the First Year of the 114th *Olympiad*, the Third of the Month *Desii*, (according to some *Historians*) but according to others on the Twenty-third or Twenty-seventh; those who determine the Day of his Death to the *Julian Kalendar*, make it to happen on the Twentieth of *May*, others on the Ninth or Twenty-third of *June*, and some on the Twenty-fifth of *July*: But the *Astronomers* who have computed their Times from thence, such as *Albategnus*, and others, make it to happen on the Twelfth of *November* at Noon being *Sunday*, on the First Day of the *Egyptian* Month *Thoth*, 324 Years current before *Christ*, in the 4390th Year of the *Julian Period*, 279 Years before the *Julian Epoch* began, and 424 *Egyptian* Years compleat, after the Commencement of the Era of *Nabonassar*.

The Epoch of the *Syrians* and *Chaldeans* began in the Reign of *Seleucus Nicator*, who succeeded *Alexander the Great*, and reigned in *Syria* and Part of *Africa* about Twelve Years after that of the Death of *Alexander the Great*.

The *Julian Epoch* which was approved of by *Julius Cæsar* himself, took it's Commencement
after

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after the Year of Confusion upon the First of *January*, which then happened on a *Friday*; this Prince observing that the Years instituted by *Numa Pompilius* the Second King of *Rome*, who succeeded *Romulus* the First Founder of the State, consisted but of Twelve Lunar Months, which had been made Use of till that Time by the *Romans*; did no ways agree with the periodical Return of the Sun, the seeming fittest Motion to govern the Year by, ordained in the Fourth Year of his Consulship, 708 Years after the building of *Rome*, in the 731st *Olympic* Year, 45 Years before the Birth of *Christ*, that for the future, the Year should consist of 365 Days 6 Hours, which Year was ever after made Use of by the *Romans*, and continued down to the present Time, and is called the *Julian Year*.

The *Spanish Era* began in the Reign of *Augustus*, in the Seventh Year of the *Julian Era*, 38 Years before *Christ*, 715 Years after the building of *Rome*, and the 738th Year of the *Olympiads*; the Occasion is said to be this, the *Romans* having divided the Empire, *Spain* fell to *Augustus*'s Share, who immediately took Possession of it; and to render this Day memorable, they took this Time for their Root or Epoch, and began after that Time to reckon *Ab Exordio Regni Augusti*, which Words being abridged, and in Process of Time the initial Letters being made Use of in the room of the Words themselves, gave Birth (as some affirm)
to

It is extremely probable that Christ's passion
was in the year 34 on Friday 14th day
of the month

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to the Word *ÆRA*, which is made Use of to
signify a Point of Time, from whence *Historians*
began to reckon.

The next in order of Time which is most
famous and best known to us, is that which
commences from the Incarnation of our Lord
and Saviour JESUS CHRIST, and in Honour
of him is called the *Christian Era* it began at
the Noon of the Thirty-first of December im-
mediately following his Birth, being Saturday,
in the 4714th Year of the *Julian Period*, the
753^d Year after the building of *Rome*, and in
the 747th Year of *Nabonassar*, and in the 324th
Year after the Death of *Alexander the Great*,
24. But with when the Solar Cycle was 10, the Lunar Cycle
us now the 2, and the Roman Indiction 4.

And although the *Christians* in general be-
gin their Epoch from the last Day of *December*,
yet the *English* and *Irish* have an Epoch a
whole Year posterior to this, which they com-
monly use in all Public and Ecclesiastical Affairs,
for they do not begin their Year with the First
of *January*, but with the Twenty-fifth of
March; and hence it comes to pass that the
English reckon from the Feast of the *Annunci-
ation* 1747, that there are compleated 1746
Years, but from the Birth of our Lord to the
Feast of the *Nativity* 1746, they number only
1745 Years elapsed, whereas all the rest of the
Christian World count 1746 Years, but for the
greatest Part of the Year the *English* design it
by the same Number that the rest of the

Christian
on April the 19, and the resurrection would
be on April 21. Therefore if the nearest Sunday
to April 21 had been set apart for *Easter Day*
it would have been an easy rule and very
near the true time; and I think this time
might have been as well commemorated by an easy
rule, that comes near the true time, as a perpetually

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Christian World does ; but from the Beginning of the Year to the Twenty-fifth of *March*, they write one Year less.

There are other Era's or Epoch's of less Use, such as that of *Dioclesian* the *Roman* Emperor, which began on the Twenty-first of *April*, the Day on which the Foundation of *Rome* was laid, in the Year of *Christ* 284, and the 4997th of the *Julian Period*; it is also called the Epoch of the *Ethiopians*, *Abissins*, and that of the *Martyrs*, because of the great Persecution that the *Christians* suffered in his Reign. Also the Epoch of the *Turks* which they call their *Hegira*, which commenced from the Flight of *Mahomet*, from the City of *Mecha* to *Jebril*, on the Sixteenth of *July* being *Friday*, in the 622^d Year of *Christ* Current, which was the Time that *Mahomet* began to preach and spread his false Doctrine : As also that of the *Persians* which is called *Yezdegird*, from a King of that Name, who died the Sixteenth of *June* being *Tuesday*, in the Year of our *Lord* 1632.

The great Difficulty of reconciling the Celebration of *Easter*, to the Institution of the *Passover*, arising from a Defect in the *Julian* Year, which was the principal View of the Council of *Nice* in the Year 325, was taken Notice of some hundred Years before Pope *Gregory XIII*, undertook the Alteration of the Calendar; and although several Attempts have been made since that Time, to adjust them as near as possible to the true Intent and Meaning

one that runs further from it. of

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of the original Institutions, yet it remains still undetermined, as will manifestly appear from what follows.

The Report made by the Lord Treasurer Burleigh, to the Lords of the Council, of the Consultation had, and the Examination of the plain and brief Discourse, by John Dee for the Queen's Majesty, 25 Martii 1582.

IT was agreed by Mr Digges, Mr Savile, and Mr Chambers, that upon their several Perusal of the Book written by Mr Dee, *as a Discourse upon the Reformation of the Vulgar Calendar for the Civil Year*, that they do allow of his Opinion, that whereas in the late *Roman Calendar* reformed, there are ten Days cut of to reduce the Civil Year to the State it was established in at the Council of *Nice*, the better Reformation had been to have cut of Eleven Days, and to have reduced the Civil Year according to the State it was in at the Birth of *Christ*. And so they all agree, that such a Reformation had been more agreeable to the Account of *Christ*; and so they do also assent, that having Regard to the Council of *Nice*, the Subtraction of Ten Days is agreeable to Truth, and therefore the better to agree with all Countries adjacent, that have received their Reformation of subtracting Ten Days, only they think it may be assented unto without any manifest Error, having Regard to observe certain Rules

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Rules hereafter for omitting some Leap Years in some hundred Years; and for the subtracting of Ten Days, Mr *Dee* has compiled a Form of a Calendar, beginning at *May* and ending at *August*, wherein every of these Four Months *May*, *June*, *July*, and *August*, shall have in the Ends of them some Days taken away without changing any Feast or Holy-Day moveable or fixed, or without altering the Courses of *Trinity* Term; that is to say, *May* to consist of 28 Days, taking from it 3 Days; *June* to have 29 Days, taking from it but one Day; *July* to consist of 28 Days, taking from it three Days; *August* to consist of 28 Days, taking from it three Days; all which Days subtracted make ten Days, in the which four Months no festival Day is changed, but remain upon the accustomed Days of their Month.

And because the *Roman* Calendar hath joined to it a great Company of Rules, of which only are capable the skilful Computists or Astronomers, it is thought good to make a short Table like an Ephemerides, to continue the Certainty of all the Feasts Moveable depending only upon *Easter*, and agreeing with the *Roman* Calendar, which may serve for an hundred or two hundred Years, and so easily renewed as we see yearly Almanacks are, if the Sins of the World do not hasten a Dissolution.

Whereupon her Majesty may please upon Report to commit it to Consideration of Council, whether She will have this Reformation

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published, which if she will, it were expedient that it were done by Proclamation from her Majesty, as thereunto advised and allowed by the Arch-Bishops and Bishops, to whose Office it has always belonged to determine and establish the Causes belonging to Ecclesiastical Government.

Reflections made on the foregoing Paper, by Mr John Greaves, Savilian Professor of Astronomy in the University at Oxford, 1645.

THIS Reformation of the *Roman Calendar* proposed by Mr *Dee*, as I cannot wholly approve, so I cannot altogether disapprove, for I like the Subtraction of ten Days as the Church of *Rome* has done, beginning the Computation from the Council of *Nice*, though it cannot be denied but that the Reformation from the Time of our Saviour had been much better, but since the Fathers of the Council of *Nice*, thought it more Wisdom to look forward than to look backward, and to have greater Care of avoiding Distractions in the Church about the Celebration of *Easter* for the future, than to remedy the Errors past; I think we shall do well with the Church of *Rome* to follow their Example; and whereas some have thought of a more exact Calculation, than this Emendation introduced by Pope *Gregory XIII*, which they Ground upon the late Astronomical Observations of the learned *Tycho Brahe*; yet
since

since the Difference is not so great, as to make any sensible Error in many Ages, and since that Error may be easily corrected by the Omission of an intercalary Day, I think it not fit for so small a Nicety to make a new Dissension in the Church, much less am I of their Opinion, who think this Correction of the Year therefore to be rejected, because it comes recommended by the Church of *Rome*, which were all one to refuse some wholesome Potion, because 'tis prescribed by a Physician, whose Manners we approve not of, and thus far I assent to Mr *Dee*.

But I cannot subscribe to his Opinion, that this Reformation should be made by the Subtraction of ten Days out of one Year alone; for tho' I grant that this were a quick Cure of a lingering Disease, yet it is against all Rules of Art in curing one Malady to make ten; for it cannot be, but that the Defalcation of ten Days in one Year, must be of infinite Disturbance in the Commonwealth, in all Contracts where necessarily a certain Time is defined. And therefore when *Julius Cæsar*, the Dictator, corrected the *Roman* Year by the Help of *Sisogenes*, a Mathematician, after this Manner, that is, by Subtraction of Days; that Year in which he did it was called by the Antients *Annus Confusionis*, by Reason of the great Confusions and Inconveniencies which thereby happened, and I doubt not but that the Year 1582, in which the Defalcation of ten Days, was made by the Bull or Edict of
Pope

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Pope Gregory XIII, might justly also be stiled *Annus Confusionis*, but such Examples as these are not to be imitated, for what *Cæsar* did as Dictator, or what *Gregory XIII* did as Pope, the one by the Power of the temporal Sword, the other of the spiritual Sword, is not to be practiced by gracious Princes.

I shall therefore humbly recommend to his Majesty's Wisdom and favourable Consideration, that Course which was long since proposed by many able Mathematicians to Pope *Gregory*, upon the first Notice of his Purpose of correcting the Calendar, which if it had been known either to Mr *Dee*, or to his learned Judges, or to the wise and honourable Lord *Burleigh*; the Reformation with us had long since been finished, and not one man prejudiced in his Estate; the Manner was this, that for forty Years Space there should be no Bissextile or Intercalary Years, or as we call them Leap Years inserted in the Calendar, by which Course it is most Evident that ten Days will be subtracted in forty Years, and these forty Years will be each of them *Anni Equabiles*, consisting of 365 Days as our common and ordinary Years do without any Alteration in the whole Year, and this being beyond all Exception, had been readily entertained by Pope *Gregory XIII*, had not his Ambition been greater than his Judgment, for he was willing to have the Honour of this Emendation, and not to leave it to his Successors, whereby the Year ever since has
been

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been called *Annus Gregorianus*; my Opinion therefore is, that by his Majesty's Letters Patents, some skilful Astronomer should be appointed to have the compiling and publishing within his Majesty's Dominions, of all Calendars and Almanacks for forty Years, in which Space by omitting the Intercalations, we shall at length come to agree with the Account of the Church of *Rome*, and every Year during this Time of forty Years shall be as this present Year 1645, and as those of 1646 and 1647 will be in the usual and ordinary Computation.

Some time before the Year 1700, when most of the Reformed Churches complied with the Alteration of the Calendar made by Pope *Gregory XIII*; the Reasons why the Churches of *England*, *Scotland*, and *Ireland*, did not then conform to it, was in a great measure owing to the three following Letters written by the Reverend and Learned Doctor *John Wallis*; one to His Grace of *Canterbury*, another to the Lord Bishop of *Worcester*, and a third to Sir *John Blencowe*, who severally requested the Doctor's Opinion of the Affair.

A Letter

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A Letter from Doctor John Wallis, (Professor of Geometry at Oxford) to his Grace the Lord Arch-Bishop of Canterbury, concerning the Alteration (suggested) of the Julian Account for the Gregorian.

For the Most Reverend Father in God, Thomas, Lord Arch-bishop of Canterbury his Grace at Lambeth.

Oxford, June 13th 1699.

May it please your Grace,

‘ **A**S to what your Grace mentions (in
‘ the Close of your Letter, which I had
‘ the Honour to receive) about altering the
‘ annual Style; I am at a Loss what to say, that
‘ there is in our Ecclesiastical Computation
‘ of the *Paschal* Tables somewhat of Dis-
‘ order is not to be denied. But I am very
‘ doubtful, that if we go to alter that, it will
‘ be attended with greater Mischief than the
‘ present Inconvenience, it is dangerous remo-
‘ ving the old Land-marks.

‘ A Thing (of Moment) when once settled
‘ (though with some Inconvenience) should
‘ not be rashly altered. Such Changes may
‘ have a further Prospect than Men at first
‘ Sight

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‘ Sight are aware of, and may be attended
‘ with those Evils which are not presently ap-
‘ prehended.

‘ In the Business of *Geography*; upon re-
‘ moving the *First Meridian* (upon some
‘ plausible Pretence) from where *Ptolomy* had
‘ placed it (though a thing at first purely ar-
‘ bitrary) it is now come to pass, that we
‘ have (in a Manner) no *First-Meridian* at
‘ all, that is, none fixed, but every new Map-
‘ maker placeth his First Meridian where he
‘ pleaseth, which hath brought a great Con-
‘ fusion in Geography.

‘ And as to the Point in Question, the Dis-
‘ order in the *Paschal Tables*, was a thing noted
‘ and complained of for three or four Hundred
‘ Years before Pope *Gregory* did (unhappily)
‘ attempt the Correction of the Calendar; but
‘ it was all that Time thought adviseable ra-
‘ ther to suffer that Inconvenience, than by
‘ correcting it to run the Hazard of a greater
‘ Mischief; and it had been much better if it
‘ had so continued to this Day, rather than
‘ Pope *Gregory* (upon his own single Au-
‘ thority) should take upon him to impose a
‘ Law on all the Churches, Kingdoms, and
‘ States of Christendom, to alter both their
‘ *Ecclesiastical* and *Civil* Year for a worse
‘ Form than what before we had.

‘ Or if merely upon account of the *Paschal*
‘ *Tables* (for he made no other Pretence) it
‘ were thought necessary to make a Change,

I

he

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‘ he might have corrected the *Paschal Tables*
 ‘ (or given us new *Paschal Tables* instead of
 ‘ those of *Dionysius*) without altering the
 ‘ *Civil Year*; which hath introduced the Con-
 ‘ fusion (which we now complain of) of the
 ‘ old and new Style; and which now can
 ‘ never be remedied, unless all Nations should
 ‘ at once agree upon one which is not to be
 ‘ supposed.

‘ I say, *at once*, for if some sooner and some
 ‘ later do alter their Style, the Confusion (in
 ‘ History) will yet be greater than it now
 ‘ is.

‘ ’Tis true that upon pretence of the Pope’s
 ‘ (usurped) Supremacy in Spirituals, (and in
 ‘ Temporals also in order to Spirituals) most
 ‘ Popish Countries (but I think not all) have
 ‘ submitted their Civil Year (as well as their
 ‘ Ecclesiastical) to the single Authority of the
 ‘ Pope’s Bull.

‘ But your Grace knows very well, that the
 ‘ Church of *England* had long before this
 ‘ pretended Correction renounced the *Pope’s*
 ‘ *Supremacy*, and that being supposed, there
 ‘ is no Pretence for the *Pope* of *Rome’s* im-
 ‘ posing a Law on the Church and Kingdom
 ‘ of *England*, to change our *Ecclesiastical* and
 ‘ *Civil Year*, more than in *Us* for that in
 ‘ *Rome*.

‘ And upon this Account, the Church and
 ‘ Kingdom of *England*, did at first not admit
 ‘ of that Change, and have hitherto retained

our

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‘ our old Constitution of the *Julian* Year ;
‘ notwithstanding the Pope’s (pretended) Su-
‘ premacy ; and I see not why we should
‘ now admit it, after having so long re-
‘ nounced it.

‘ And really though it may not yet appear
‘ and be owned above-board ; and those who
‘ now press for an Alteration be not aware of
‘ it, and be far from any Popish Design, I
‘ cannot but think there is at Bottom a latent
‘ Popish Interest, which (under other specious
‘ Pretences) sets it on foot, in order to obtain
‘ (in Practice) a kind of tacit Submission to the
‘ Pope’s Supremacy, or owning his Authority.
‘ And though they be so wise as to say nothing
‘ of it at present, (for the Bait is designed to hide
‘ the Hook till the Fish be caught) they will
‘ please themselves to have gained *de facto*, what
‘ in Words we disclaim ; for there is nothing but
‘ the Pope’s Bull, which should induce the
‘ Change of the (*Civil*) *Julian* Year (which is
‘ much better) for the new *Gregorian*, for the
‘ Equinox going backwards (for 10 or 11
‘ Minutes each Year,) is very inconsiderable,
‘ and which in celestial Computations is easily
‘ rectified, as are many other Inequalities of
‘ much greater Concernment.

‘ And I think it was never pretended that
‘ the *Civil* Year must needs agree (exactly to a
‘ Minute) with the *Celestial*, and if never so
‘ much affected is impossible to be had ; for
‘ the *Solar* Year, and the *Siderial* Year, differ

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‘ more from each other than the *Julian* from
‘ *either*, which is a Middle betwixt them.

‘ And the Seat of *Easter* (which only con-
‘ cerns the Ecclesiastical, not the Civil Year)
‘ may be easily rectified if need be, without
‘ affecting the *Civil* Year at all.

‘ Or if not rectified, the Celebration of
‘ *Easter* a Week or Month sooner or later,
‘ doth not influence at all our solemn Commemoration of *Christ*’s Resurrection.

‘ And ’tis agreed by most (if not all) Chronologers, that as to the Year of our Lord
‘ the *Annus Vulgaris* is not the *Annus Verus*,
‘ (though it be not agreed how much it differs)
‘ but it would be a horrible Confusion in History, if we should now go about to alter the
‘ vulgar Account.

‘ All the Pretence that I can understand for
‘ altering our Style, is only that in so doing we
‘ should agree with some of our Neighbours
‘ with whom we now differ; but it will then
‘ be as true that we shall differ from others
‘ with whom we do now agree; we should
‘ agree with *France*, but differ from *Scotland*,
‘ (which as to us is more considerable) and
‘ with all others who yet follow the Old
‘ Style.

‘ If it be said that they in Time may come
‘ so to do by our Example. This would but
‘ make the Confusion yet the greater; for then
‘ we must be obliged not only to know what
‘ Places do use the New Style, but from what

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‘ Time they began so to do, if we would understand their Dates.

‘ And if we should by a new Law alter our Style in *England*, this would not comprise *Scotland*, and we cannot promise ourselves that they would presently comply also : For (according to the present Constitution of that Church) they are not so pliable to comply with the *Modes* of *Rome* as some in *England* are ; and the Business of *Easter* (which has the sole Pretence of the first Alteration) would to them signify nothing, who according to their Constitution observe no *Easter* at all, but do rather declare against it.

‘ And when all is done there will still be a Necessity of keeping up the Distinction of Old Style and New Style, (which Pope *Gregory*’s pretended Correction hath made necessary) and with that Distinction, things may be now as well adjusted as if we should now change our Style.

‘ I forbear to discourse at large (that I be not too tedious) how much a better Constitution the *Julian* Year is, and more advisable than the New *Gregorian*, which is a thing so notorious that no Astronomer (who understands the Methods of Astronomical Calculations) though a Papist can be ignorant of, however they may please to dissemble it; insomuch that in their Astronomical Calculations, they are fain first to adjust their Calculations

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‘ lations to the *Julian* Year, and thence transfer them to their New *Gregorian*.

‘ And consequently how unreasonable it is for us to exchange our better *Julian* Year for one that is so much worse; it would be much more reasonable (save that they will never be induced to part with ought which may favour their Usurpation how absurd soever) that the Papists should quit their new *Gregorian* and return to their old *Julian* Year.

‘ But I forbear to enlarge on this (and many other things which might be alledged) and humbly beg your Grace’s Pardon for having already given you the Trouble of so long a Letter,

And am,

my Lord,

Your Grace’s

very Humble and

Obedient Servant

JOHN WALLIS.

A POSTSCRIPT to be added to a former Letter to the Lord Arch-bishop of Canterbury.

Postscript, *Aug.* 31. 1699.

‘ **O**F what Mr *Locke* hath done in this
‘ Matter, I know nothing but from
‘ your Grace’s Letter of *Aug.* 27. 1699; It
‘ seems he advises, that for eleven Leap Years
‘ we should omit the Intercalation of *Feb.* 29,
‘ and thence-forth go on with the *Gregorian*
‘ Account, the last of which eleven Leap
‘ Years should be 1744: But if we begin in
‘ the Change (as it is suggested) at the Year
‘ 1700, the last of those eleven Leap Years
‘ must be 1740 not 1744.

‘ This Expedient is the same that was
‘ (during our Civil Wars) suggested by those
‘ then at *Oxford* in the Year 1645, viz. that,
‘ from thence forward we should omit Ten
‘ such Intercalations.

‘ Against which there seems to me this great
‘ Objection; In the Time of *Julius* and *Au-*
‘ *gustus Cæsar*, there was a Year which was
‘ called *Annus Confusionis* upon the settling,
‘ unsettling, and resettling the *Julian* Year, of
‘ which *Kepler* gives an Account, with the
‘ Mischiefs of it (in his *Tabulæ Rudolphinæ*,
‘ with the Title *Typus Anni Confusionis*, and
‘ the

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‘ the like) in the Year 1582, when Pope
‘ Gregory did at once strike out Ten Days of
‘ that Year.

‘ But if this Advice should take Place, we
‘ should now instead of one *Annus Confusionis*,
‘ have a *Confusion* for *four and forty* Years
‘ together, wherein we should agree neither
‘ with the *Old* nor with the *New* Account, but
‘ be sometimes 10 Days, sometimes 9 Days,
‘ sometimes 8 Days, (and so forth) later than
‘ the one and sooner than the other Account,
‘ and a Foreigner would not be able to judge
‘ of an *English* Date, without knowing in
‘ which of these Years we vary 10, 9, or 8
‘ Days, and so forth, from either of these Ac-
‘ counts, and this for 44 Years together, which
‘ seems to me a much greater Confusion, than
‘ if (as in 1582) we should (once for all) cast
‘ out Eleven Days; but I cannot think it ad-
‘ viseable to do either.



A Letter

A Letter from Doctor Wallis, to the Bishop of Worcester upon the same Subject.

*For the Right Reverend Father in God,
William, Lord Bishop of Worcester at
Whitehall.*

Oxford, June 30th 1699.

May it please your Lordship,

‘ **I** N a late Letter which I had the Honour
‘ to receive from my Lord Arch-bishop’s
‘ Grace of *Canterbury*, his Grace was pleased
‘ to intimate as a thing now under Considera-
‘ tion, about changing the Style of our Civil
‘ Year.

‘ It may perhaps be Presumption in me, to
‘ interpose my Thoughts with your Lordship in
‘ a Business of that Nature; but I must needs
‘ think it a tender Point to touch upon, and
‘ which, if we attempt it, may be attended
‘ with greater Mischiefs than we may at first
‘ be aware of; I adventured to say somewhat
‘ to that Purpose in a Letter to his Grace, but
‘ more may be said.

‘ That the Difference of Styles doth create
‘ some Confusion in History, is not to be de-
‘ nied, (and ’tis very unhappy that Pope
K Gregory

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‘ Gregory XIII, did in the last Century attempt it) but it is now unavoidable and cannot be remedied; for it is not *England* only that useth the *Julian* Year, but all the three Kingdoms of *England*, *Scotland*, and *Ireland*, and all our *Foreign Plantations*, which are not a few; and the two Kingdoms of *Denmark* and *Sweden*, the *Protestant Cantons* of *Switzerland*, and four of the seven united Provinces, and how many more of the Protestants in *Germany* I cannot presently say; and if we should now change our Style in compliance with some of our Popish Neighbours, from whom we differ, we should then vary from the Protestants with whom we now agree.

‘ And particularly from *Scotland*, (with whom we are more concerned to agree than with *France*) for we are not to presume that they will presently change at the same time with us: ’Tis happy that they did comply with us in the late Revolution (to be under the same *King* with us) we cannot presume that they will be so fond of Compliance in all the *Modes* of *Rome*, as is very evident in their not admitting Episcopacy, nor the Observation of *Easter* (which latter was the only Pretence of first introducing the *Gregorian Year*).

‘ So that there will still be as great Necessity of *S. V.* and *S. N.* (Old Style and New Style as now there is, *without which* we shall

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‘ be at a loss in History to judge distinctly of
‘ Dates, and *with* it we are now as easy as if
‘ we change.)

‘ If it be said that other Protestants may in
‘ time be induced to follow our Example, per-
‘ haps some may, not all ; but this would but
‘ make the Confusion yet greater, for thence-
‘ forth, we must be obliged (if we would be
‘ at a Certainty in History) not only to know
‘ *what Countries* do use this or that Style, but
‘ from what Time they began so to do.

‘ It would be much more adviseable (if the
‘ Papists would be as compliant as they would
‘ have us to be) for the Papists to *return* to
‘ their *old Julian* Year, than for us to *embrace*
‘ their *new Gregorian*, and it might much
‘ easier be effected ; for, if the Pope could be
‘ persuaded to grant a Bull to that Purpose, all
‘ the Papists would at once be as much obliged
‘ so to do, as by Pope *Gregory's* Bull to vary
‘ from it ; if it be said there is no hopes of that,
‘ then the Argument stands ; if the Pope will
‘ not leave his pretended Supremacy, then we
‘ must admit it.

‘ That the *Julian* Year is in itself a better
‘ Form, and more adviseable, than the *New*
‘ *Gregorian*, is undeniable ; and all Astronomers,
‘ even Papists themselves (if not otherwise
‘ bigotted in favour of the Pope's Supremacy,
‘ and the Infallibility of the *Roman* Church)
‘ cannot but know it, insomuch that in many
‘ Cases they are fain (or find it adviseable) first

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‘ to adjust their Calculations to the *Julian*
 ‘ Year, and thence transfer them to the *Gre-*
 ‘ *gorian*.

‘ And there is no Inducement for our chang-
 ‘ ing our better Year for a worse, but only in
 ‘ Compliance with the Pope’s pretended *Supre-*
 ‘ *macy*, not only over all Churches and King-
 ‘ doms, but even the Celestial Motions (as
 ‘ Pope *Gregory* in his Bull doth wisely pre-
 ‘ tend).

‘ Now ’tis well known that long before Pope
 ‘ *Gregory*’s Bull, *England* had renounced the
 ‘ *Pope’s Supremacy*, (and are therefore uncon-
 ‘ cerned in that Bull) and I see no Reason
 ‘ why (after so long a Disclaimer) we should
 ‘ be now fond to readmit it: But what greater
 ‘ Evidence (of owning that Authority) can (in
 ‘ Practice) be expected, than obeying their
 ‘ Commands in things (otherwise) unadvise-
 ‘ able? *Hoc Ithacus velit et magno mercenter*
 ‘ *Atridae*, and no Doubt but the *Hand of Joab*
 ‘ is in the Matter, though perhaps we do not
 ‘ see it.

‘ As to ourselves, this cannot be done with-
 ‘ out altering the *Act of Uniformity*, and alter-
 ‘ ing the *Common Prayer Book*; (for at least
 ‘ all the Calendar must be new framed) and
 ‘ your Lordship knows how warm some were
 ‘ a while since against touching that in the least,
 ‘ or so much as considering (on the King’s
 ‘ Commission for that Purpose) whether ought
 ‘ in it might be changed for the better.

‘ If

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‘ If yet your Lordship think it necessary that
‘ the *Seat of Easter* should be rectified, that
‘ may easily be done without altering the *Civil*
‘ Year; for if in the *Rule for Easter*, instead
‘ of saying *next after the one and twentieth of*
‘ *March*, you say *next after the Vernal Equi-*
‘ *nox*, the Work is done, (and we might be
‘ excused the Trouble of *Paschal Tables*) and
‘ the intricate Perplexities of the *Gregorian*
‘ *Epacts*; for then every Almanack will tell
‘ you *when it is Equinox and when it is Full*
‘ *Moon* for the present Year, (without disturb-
‘ ing the Civil Account) and this *Pope Gregory*
‘ might as well have done without troubling
‘ the Account of Christendom.

‘ But if he would needs disturb the *Civil*
‘ Year, he should have rectified it (not to the
‘ time of the Nicene Council, but) to the
‘ Time of our *Saviour's Birth*, for our Epoch
‘ is not from the *Nicene Council*, but from the
‘ *Birth of Christ*: We do not say *Anno Niceni*
‘ *Consilii*, but *Anno Domini*; and most certain
‘ it is, that at our *Saviour's Birth*, the Vernal
‘ Equinox, was not on the *one and twentieth of*
‘ *March*, (as this new Account would suppose)
‘ but nearer to the five and twentieth.

‘ It is alledged as an Argument why *now* to
‘ change, because the Difference which this
‘ Year is but ten Days, will next Year be eleven
‘ Days.

‘ But my Lord we must be very weak Dis-
‘ putants to be caught by such a Fallacy;
‘ (which

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‘ (which is barely begging the Question) the
 ‘ Point in Question is not *why now*, but *why at*
 ‘ *all*; it is not we that have departed from
 ‘ them, but they from us; the Julian Year
 ‘ was their Year as well as ours till the Year
 ‘ 1582, when a Fancy took Pope Gregory to
 ‘ exchange a better Year for a worse, and di-
 ‘ sturb the Christian World, and then the Ar-
 ‘ gument if it signify any thing stands thus;
 ‘ *the farther they be gone astray, the more Rea-*
 ‘ *son there is that we should follow them*; I
 ‘ should rather argue, *the more Reason there is*
 ‘ *why they should return*, (to that from whence
 ‘ they went astray) *we are as we were*; (and
 ‘ as they were till that time) and the Reason
 ‘ why we did not then change, remains still
 ‘ good why we should not make that Change
 ‘ *at all*: If this Point had been started in our
 ‘ late King James’s time, I desire your Lord-
 ‘ ship to consider with what Face it would have
 ‘ looked, and if the Mask be taken off, the
 ‘ Face is still the same.

‘ I find it was started in the time of our Civil
 ‘ wars (about the Year 1644) by those about
 ‘ the King, when Oxford was the King’s head
 ‘ Quarters, but the Project did not then suc-
 ‘ ceed, by Reason that the King’s Party (in
 ‘ that Contest) were not prevalent, and your
 ‘ Lordship knows very well how much it was
 ‘ to the Prejudice of the King’s Cause, that
 ‘ those on the other Side would suppose him
 ‘ to be too much influenced by Popish Councils,
 ‘ of

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‘ of which this was a great Instance ; and no
‘ Doubt they will be as ready to push it forward
‘ upon any the least Pretence, whenever they
‘ find us soft enough to receive the Impression,
‘ not perhaps under the Names of Julian and
‘ Gregorian, (for the Word Gregorian speaks
‘ too plain but under the softer Terms) of *Old*
‘ and *New Style* ; otherwise so much Weight
‘ would not be laid upon so slight a Pretence,
‘ for the Addition of *Old Style* and *New Style*,
‘ will certainly determine the Difference of
‘ *Eleven* Days in the next Century, as of *Ten*
‘ in this, if nothing else were in the Wind, we
‘ have been too often caught in such Snares.

‘ I forbear to say more (though more might
‘ be said) that I may not too much presume on
‘ your Lordship’s Leisure.

But am,

my Lord,

Your Lordship’s

very Humble Servant,

JOHN WALLIS.

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The following Letter was wrote by Doctor Wallis, to Sir John Blencowe, about the Celebration of Easter in the Year 1698.

A Letter of Dr John Wallis, of May 14th 1698, to Sir John Blencowe, (one of his Majesty's Juslices of the Court of Common-Pleas) concerning the Observation of Easter for this present Year, on April 24th 1698.

Oxford, May 14th 1698.

S I R,

‘ I N answer to your’s of *May* the twelfth,
‘ (which I received this Morning) you
‘ may please to present my humble Duty and
‘ Service to the Lord Chief Justice *Holt*, with
‘ this Account of the *Seat of Easter* of which
‘ he asketh.

‘ That there may be some little Mistakes in
‘ the Calendar of the Common Prayer Book
‘ (as now printed) I shall not deny, but (as to
‘ the present Point) *Easter* was observed this
‘ Year according to the Rules so understood as
‘ was intended, though there may seem to be
‘ wanting a Rubrick to make it plain.

‘ The

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‘ The fundamental Rule of the Nicene
‘ Council, which we pretend to follow for the
‘ keeping of *Easter*, is to this Purpose; *Easter*
‘ Day is to be that *Sunday* which falls *upon*,
‘ or *next after* the first Full Moon, which
‘ happens next after the Vernal Equinox.

‘ Which Vernal Equinox was then observed
‘ to fall on the One and Twentieth of *March*,
‘ and (in the Paschal Tables) is yet reputed so
‘ to fall. (though it do now fall on the Eleventh
‘ of *March*, or sometimes the Tenth of *March*)

‘ And therefore instead of *next after the*
‘ *Vernal Equinox*, we say *next after the One*
‘ *and Twentieth of March*; but then it is said
‘ (by a Mistake I suppose) after the first Full
‘ Moon, instead of *upon or next after the first*
‘ *Full Moon*, (for so it is to be understood) and
‘ added, *and if the Full Moon happens upon a*
‘ *Sunday, Easter Day is the Sunday after*, which
‘ must needs be a Mistake; for in such Case it
‘ is to be *that Sunday*, not *the Sunday after*.

‘ And so the Tables agree, (contrary to this
‘ Note) both that *for Forty Years*, and that *to*
‘ *find Easter for ever*; and so it was observed in
‘ the Years 1668, 1678, and 1682, and so when-
‘ ever the Case happens that the Ecclesiastical
‘ Full Moon falls on a *Sunday*; but this (though
‘ it be a Mistake) doth not influence the pre-
‘ sent Case.

‘ That which concerns the present Case, is on
‘ what Day, we must reckon the *Ecclesiastical*
‘ Full Moon to fall; for we are not to judge,

L

‘ either

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‘ either the *Equinox* or the *Full Moon*, according
 ‘ as they happen in the Heavens, or in our Al-
 ‘ manacks, but according to the Paschal Tables
 ‘ fitted to the time of the Nicene Council.

‘ And accordingly we reckon the Equinox
 ‘ to be now (as then it was) on *March* the
 ‘ Twenty-first.

‘ And as to the Full Moon, (next after
 ‘ that Equinox) we are to account it thus.

‘ The Golden Number (fitted to the Cycle
 ‘ of Nineteen Years, after the end of which it
 ‘ begins again at 1, 2, 3, &c.) is placed in
 ‘ the first Column of our Calendar, to tell us
 ‘ on what Day (of such Year) the New Moon
 ‘ is *supposed* to happen in each Month, and the
 ‘ Fifteenth Day of that Moon is *reputed* the
 ‘ Full Moon.

‘ Now the Golden Number for the Year
 ‘ 1698, is 8; that is, this is the Eighth Year
 ‘ of such *Decem-Novenal* Cycle, or Circle of
 ‘ Nineteen Years, commonly called *Cyclus Luna-*
 ‘ *ris*, or the Circle of the Moon; as the other
 ‘ Circle of 28 Years, is called *Cyclus Solaris*,
 ‘ the Circle of the Sun, or rather of the Sun-
 ‘ day Letter.

‘ And this Number 8 stands in the Calendar
 ‘ at *March* the Sixth, which we must therefore
 ‘ *suppose* to be New Moon (though the New
 ‘ Moon were indeed *March* the Second, like
 ‘ as it happens constantly in this Age, that the
 ‘ true New Moon is Four or Five Days sooner
 ‘ than the reputed Ecclesiastical New Moon).

‘ Now

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‘ Now *March* the Sixth being the New
‘ Moon or First Day of the (*reputed*) Lunar
‘ Month, (for such Year) *March* the Twen-
‘ tieth will be the Fifteenth Day, or the (*re-*
‘ *puted*) Full Moon for the Month of *March*
‘ this Year.

‘ Which happens this Year to be Sunday
‘ (the Dominical Letter for this Year be-
‘ ing B).

‘ But this happening before *March* the
‘ Twenty-first, (the supposed Equinox) can-
‘ not be the Paschal Full Moon, but we must
‘ wait for another; and we shall then find the
‘ Golden Number 8 standing at *April* the Fifth
‘ for the New Moon of *April* the same Year;
‘ and therefore the Full Moon or Fifteenth
‘ Day of that (*reputed*) Lunar Month is to be
‘ *April* the Nineteenth, but the true Full Moon
‘ was *April* the Fifteenth about Six a Clock in
‘ the Morning.

‘ Which (*April* the Nineteenth) being *Tues-*
‘ *day*, the *Sunday* next following is *April* the
‘ Twenty-fourth, (where stands B the Sunday
‘ Letter for this Year) which is therefore to be
‘ *Easter Day* according to the Intent of these
‘ Tables, and it was observed accordingly.

‘ But it were to be wished there had been
‘ somewhere a Rubrick to direct how we are
‘ to find this Reputed Full Moon, and what is
‘ the Use of the Golden Number.

‘ The Difference of the Ecclesiastick Ac-
‘ count in the Paschal Tables, from that of the

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‘ Heavens, doth arise from hence; because
‘ those Tables when first made were fitted not
‘ to this Age, but to that of the Nicene Council, and did at that Time agree very near
‘ with that of the Heavens; but in this Age
‘ they do considerably differ, (both as to the
‘ *Equinox*, and as to the *Full Moons*) for these
‘ two Reasons:

‘ 1. The common Julian Year (by which
‘ we reckon) of 365 Days and Six Hours, is
‘ somewhat too long, being about 11 Minutes
‘ of an Hour longer than the true Solar Year,
‘ by reason whereof, the *Equinox* (and other
‘ annual Seasons) go backwards about 11 Minutes every Year; which, from the Time of
‘ the Nicene Council till now, amounts to about 11 Days; so that the *Equinox* which
‘ then happened *March* the Twenty-first, is
‘ now come back to our *March* the Eleventh,
‘ or rather *March* the Tenth,

‘ Which upon Pope *Gregory*’s reforming the
‘ Roman Calendar, (above 100 Years since)
‘ causeth the Difference of Ten Days, between
‘ what we call the *New Style*, and the Old
‘ Style; which (two Years hence) in the Year
‘ 1700, (and thenceforth for 100 Years) will
‘ be Eleven Days.

‘ 2. It was then supposed that in Nineteen
‘ Years, (which is the Compass of the Golden
‘ Number) the Lunations (of New Moon and
‘ Full Moon) did return to the same Day and
‘ Hour as they were Nineteen Years before.

‘ Which

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‘ Which is pretty near the Truth, but comes
‘ short by about an Hour and a Half.

‘ Which Hour and a Half in every Nine-
‘ teen Years, doth since that Time amount to
‘ about Four or Five Days.

‘ Whence it comes to pass, that the *reputed*
‘ Full Moon is later by Four or Five Days,
‘ than that of the Heavens.

‘ But our *Easter* is reckoned according to
‘ the reputed Full Moons, (derived from the
‘ Golden Number) not according to those of
‘ the Heavens.

‘ ’Tis true that in some places of our Calen-
‘ dar, (as commonly printed) the Golden
‘ Numbers are mis-placed or mis-written, but
‘ it happens so luckily, that in all those where-
‘ in *Easter* is concerned, (that is from *March*
‘ the Sixth to *April* the Fifth inclusively) they
‘ be rightly placed.

‘ And as to any other New Moons, if there
‘ be any Mistakes, we are therein less con-
‘ cerned.

F I N I S.

E R R A T A.

Page 40 Line 8, for Days read Years. Page 48 Line 29,
for Twenty-second read Twentieth.

Which is pretty near the Truth, but comes short by about an Hour and a Half.

Which Hour and a Half in every Nineteen Years, doth make that Time amount to about Four or Five Days.

Whence it comes to pass, that the reputed Full Moon is later by Four or Five Days than that of the Heavens.

But our Way is reckoned according to the reputed Full Moon, (derived from the Golden Number) not according to that of the Heavens.

'Tis true that in some places of our Calendar, (as commonly the Golden Numbers are not written, but it happens to look like that where in Latin is contained from March the sixth to April the fifth inclusively) they be rightly placed.

And as to any other New Moons, if there be any Mistakes, we are therein less concerned.



W I A

E R A T A

Page 48 line 8. for Days read Years. Page 48 line 29. for Twenty read read Twenty.

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